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UTERINE TUMOURS

Their Pathology and Treatment

BY

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PREFACE

It has been pointed out by Herbert Spencer, that there are three grades of knowledge: (1) knowledge of the lowest kind, which consists of isolated facts, or *ununified* knowledge; (2) science, or *partially unified* knowledge; and (3) philosophy, or *completely unified* knowledge.

It must be confessed that the tangle of disjointed facts, which passes for medical science in this country, seldom rises above the level of the lowest of these grades. In other words, our medical science lacks the Eye of Philosophy.

It is, says Renan, 'Not unlike a magnificent library turned upside down.' Nearly everything is there; but in such a confused, pell-mell, and thoroughly unclassified state, that it might almost as well not be there.

In like manner Buckle—one of the greatest of English thinkers—has expressed himself on this subject, as follows:

'Our scientists display an inordinate respect for experiments, an undue love of minute details, and a disposition to over-rate the invention of new instruments, and the discoverers of new, but often insignificant, facts. . . . We are in the predicament that our facts have outstripped our knowledge, and are now encumbering our march. The publications of our scientific institutions, and of our scientific authors, overflow with minute and countless details, which perplex the judgment, and which no memory can retain. In vain

do we demand that they should be generalised and reduced into order. Instead of that, the heap continues to swell.'

Such being the actual condition of our science, the true task for medical authors of the twentieth century, must be the generalisation and reduction into order of the vast masses of chaotic facts, which constitute medical lore.

To this end, nothing will I think be more conducive, than the writing of reliable monographs, on every department of medical knowledge.

It is in this belief, and in this spirit, that I have entered on the present task, which—if humble and laborious—will I trust, nevertheless, be useful.

CLIFTON, BRISTOL,
November 1, 1900.

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UTERINE TUMOURS

CHAPTER I

THE VARIETIES OF UTERINE NEOPLASMS AND THEIR RELATIVE FREQUENCY

UTERINE tumours are of great interest to the surgeon and pathologist, as well for the frequency of their occurrence as for the important surgical procedures often undertaken for their removal. It may be said that all the benign and many of the malignant tumours of this part of the body have now been brought within the reach of the surgeon's knife. It was very different half a century ago, when but little was known of the pathology of these tumours, and their surgical treatment was limited to the occasional removal of specimens that projected into the vagina.

Notwithstanding the great advances that have been made since then, and the prodigious amount of literature that has been published, not a single monograph—dealing with the ensemble of the subject—has appeared in the English language since the publication of Stafford Lee's work in 1848. There is therefore a wide field needing cultivation; and to this task I have dedicated the present volume.

I now propose briefly to set forth some results of a statistical investigation of uterine neoplasms, and then to make passing reference to the bearing of the facts thus revealed on the question of pathogenesis.

The great frequency of uterine tumours is shown by the following data:

Of 13,824 patients of both sexes, with primary neoplasms, consecutively under treatment at four large London hospitals, I have ascertained that 2,649 were of uterine origin, or 19·2 per cent.; while next in order of frequency came the mammæ with 17·5 per cent.; then the skin with 9·4 per cent.; and far removed from the last, the stomach with only 2·6 per cent.

Similarly, of 13,971 neoplasms analysed by Gurlt, the patients being under treatment at the chief Vienna hospitals, 4,115 originated from the uterus, or 29 per cent.; next in order came the skin with 12 per cent., the mammæ with 11 per cent., and the stomach with 8 per cent.

Of the patients in my list, 9,227 were females. In 28·7 per cent. of these the uterus was the organ affected; the mammæ in 26 per cent.; the ovaries in 8·7 per cent.; and the stomach in only 1·4 per cent.

Of my 13,824 neoplasms, 7,297 were cancers. Of the latter, 4,628 occurred in persons of the female sex; the uterus being the seat of origin in 1,571, or in 34 per cent., the mammæ in 40·3 per cent., the skin in 4·1 per cent., and the stomach in 2·8 per cent.

Of Gurlt's 13,971 neoplasms, 9,898 were cancers: 7,020 of the latter occurred in persons of the female sex, the uterus being affected in 3,449, or in 49 per cent., the mammæ in 20 per cent., and the stomach in 7 per cent.

For comparison with the above clinical data, I append some of the results deducible from the chief mortality statistics.

From the Registrar-General's analysis of the cancer mortality of England and Wales for the year 1897, I find that among females the uterus, etc., was the seat of the disease in 23·5 per cent., the mammæ in 15·5 per cent., the stomach in 13·3 per cent., and the liver in 13·2 per cent. Similar returns for the years 1888 and 1868 show the following percentages: uterus 34·7, mammæ 21·2, and stomach 10·9.

From the reports of the Registrar for Ireland for the years

1887-89, it appears that among women the stomach was the part affected in 22·4 per cent., mammæ in 21·5 per cent., and uterus in 14·1 per cent.

The Frankfort-on-Main mortality returns for the thirty years 1860-89 show that the uterus was the seat of the disease in 27·5 per cent. of the female cancer mortality, the stomach in 18·5 per cent., and the mammæ in 11·3 per cent.

It will be gathered from the foregoing that these mortality statistics differ from the clinical data chiefly in that they indicate greater frequency of the disease in the stomach, etc.

Schroeder's analysis of 19,666 cases of cancer in women shows that 33·3 per cent. were uterine; and of 8,746 similar cases tabulated by Simpson, 34·3 per cent. were of the uterus.

Of the 9,227 females with neoplasms in my list, in 2,649 (28·7 per cent.) the uterus was the part affected. In these cases the relative frequency of the occurrence of the different varieties of uterine tumour is shown by the subjoined table:

ANALYSIS OF 2,649 CONSECUTIVE CASES OF UTERINE NEOPLASMS.

Cancer	1,571
Sarcoma	2
Myoma	883
Polypus (non-myomatous)	191
Cystoma	2
Total	2,649

Of Gurlt's 4,115 uterine neoplasms, 3,449 were cancers, 8 sarcomas, 481 myomas, 175 polypoid pseudoplasms, and 2 were papillomas.

Throughout the organism in general, malignant neoplasms occur in females with greater relative frequency than non-malignant ones, the ratio being, according to my estimate, 55 per cent. of the former to 45 per cent. of the latter. In the uterus the proportionate numbers are 59·38 per cent. of the former to 40·62 per cent. of the latter.

In order to show the relative frequency of the chief uterine

neoplastic manifestations in comparison with those of the female organism in general, and with those of the female mammæ, ovaries, skin and stomach (in females), I have compiled the subjoined table:

TABLE SHOWING THE RELATIVE FREQUENCY OF FEMALE NEOPLASMS IN GENERAL, AS COMPARED WITH UTERINE, MAMMARY, CUTANEOUS, GASTRIC, AND OVARIAN NEOPLASMS.

Kind of Neoplasm.	Female Neoplasms in General per cent.	Uterine Neoplasms per cent.	Female Breast Neoplasms per cent.	Skin Neoplasms in Females per cent.	Gastric Neoplasms in Females per cent.	Ovarian Neoplasms per cent.
Cancer	48·7	59·30	77·7	34·1	100	3·36
Sarcoma	6·3	·08	3·9	1·8	nil	2·98
Non-malignant neoplasms	33·4	40·54	15·7	29·1	nil	·12
Cysts	11·6	·08	2·7	35·0	nil	93·54

This shows that the proneness of the different organs to evolve the various neoplasms is extraordinarily variable. Thus, while in some organs certain neoplasms hardly ever arise, these same organs, nevertheless, often originate other neoplasms, although the latter are of the rarest occurrence in yet other organs.

Thus, although the proneness of the uterus to originate cancer, as compared with its proneness to originate other neoplasms, is above the average for females in general, yet it is much surpassed in this respect by the stomach and mammæ; the liability of the skin is, however, much less, while that of the ovaries is quite insignificant.

On the other hand, so great is the relative frequency of cancer of the stomach, as compared with its liability to other neoplasms and cysts, that for practical purposes the very existence of these latter may be ignored.

Although the liability of all these organs to sarcoma is much below the average, yet *inter se* the relative frequency of its occurrence presents considerable variations. In the uterus and stomach, for instance, sarcoma is remarkably

rare; whereas in the female breast, ovaries, and skin it is relatively not so very uncommon.

The most striking feature in the neoplastic pathogeny of the uterus, however, is its great relative proneness to non-malignant growths; with this the almost complete immunity of the stomach and ovaries from such growths contrasts markedly.

Again, while the relative proneness of the uterus and stomach to originate cysts is infinitesimal, yet tumours of this kind arise in the ovaries with such preponderating frequency as to reduce the ratio of all other ovarian tumours to insignificant proportions.

In every part of the body where neoplasms arise we meet with similar phenomena.

These extraordinary differences in morbid proclivity are among the most remarkable facts in the whole range of neoplastic pathogeny, and no doubt the solution of the problem of the origin of neoplasms concentres in them.

It seems to me impossible to account for such vagaries, otherwise than as the result of biological peculiarities inherent to the various tissues of the affected parts. No doubt in every such locality there must be corresponding morphological changes, although the microscope has hitherto failed adequately to reveal them. In this connection some recent observations of Ribbert's are of importance. He has shown that cancer is most prone to arise from epithelia in which active mitotic changes are normally always present, or in which such changes manifest themselves under certain physiological conditions (as in the mammæ and uterus); whereas in organs whose epithelia seldom exhibit mitoses, such as the salivary glands, lachrymal glands, thyroid, thymus, male mammæ, etc., cancers seldom arise. These observations give direct anatomical support to the doctrine I have long advocated on other grounds—viz., that cancers are most prone to arise in localities where cells still capable of growth and development most abound.

From the fact that no part of the body—not even the mamma—undergoes so many remarkable post-embryonic

developmental changes as the uterus—which, moreover, also possesses unique reparative powers—we may infer that it is unusually rich in cells, still retaining much of their embryonic capabilities. The behaviour of the uterus, as compared with the tube, under the stimulus of pregnancy strikingly illustrates these remarks. When a fertilised ovum lodges in the uterine cavity, the walls of the latter grow so rapidly that they readily adapt themselves to the requirements of the nascent embryo; but when the ovum is arrested in the Fallopian tube and develops there, although at first the tubal structures grow so as to accommodate it, yet as the embryo augments the increase of these structures fails to keep pace with it, so that the tube is eventually ruptured.

It is probably owing to inherent peculiarities of this kind that the uterus is so much more prone to originate neoplasms than other parts of the body. In like manner, the great proclivity of certain regions of the uterus to similar outbreaks, and the comparative immunity of other regions, may probably be explained. Thus, while over 90 per cent. of all uterine myomata spring from the corpus, only about 5 per cent. of uterine cancers originate from this part; on the other hand, while nearly 95 per cent. of all uterine cancers spring from the cervix, only about 10 per cent. of uterine myomata are of cervical origin. It is thus evident that the influence of locality in determining the genesis, structure, and qualities of uterine neoplasms is very great.

CHAPTER II

THE DEVELOPMENT AND LIFE-HISTORY OF THE UTERUS

PATHOLOGICAL neoplastic products are never of such a monstrous nature, as not to present some analogy with the normal structures of the part whence they originate, either in their embryonic or post-embryonic states; hence, no study of the life-history of neoplastic processes can be complete, which ignores pre-existing structural peculiarities.

I think there can be no doubt that the origin of uterine neoplasms is very often closely associated with developmental irregularities, although the links connecting these extremes have for the most part yet to be precisely determined. In the sequel I shall often have occasion to revert to this subject.

The development of the uterus is intimately connected with that of the urinary and sexual organs, whose rudiments appear at a very early stage of embryonic life; and at first they are similar in both sexes. This is their condition in the human embryo of eight weeks.

In all vertebrates the first structure to appear is the Wolffian, mesonephric, or segmental duct, which is primarily related to a very ancient urinary apparatus confined to the head region (the pronephros). In the higher vertebrates this body has only a transitory embryonic existence, and its ultimate fate is unknown; but it has been suggested that it contributes to the formation of the suprarenal capsule. All that is certainly known is that its duct persists, and subsequently becomes the excretory channel of a much more extensive urinary system that develops later, and is known as the mesonephros, or Wolffian body. This after a time

aborts, so that in the adult human being only some functionless vestiges of it remain. Man's permanent kidney (the metanephros) subsequently arises in connection with an outgrowth—which ultimately becomes the ureter—from the Wolffian duct.

Another important structure in this connection is the Müllerian duct, which is essentially an ovi duct.

These are the parts more particularly concerned in the development of the uterus, and we want to know whence they originate and what eventually becomes of them. Among embryologists great diversities of opinion prevail as

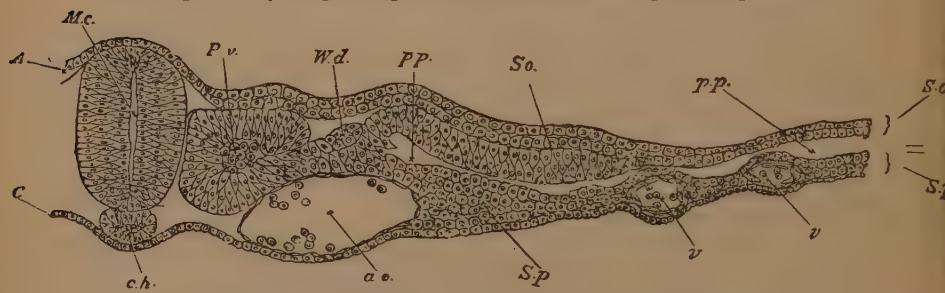

FIG. 1.—TRANSVERSE SECTION THROUGH THE DORSAL REGION OF AN EMBRYO CHICK OF FORTY-FIVE HOURS. (BALFOUR.)

A, Epiblast; *C*, hypoblast; *M.c.*, medullary (neural) tube; *P.v.*, mesoblastic somite; *W.d.*, Wolffian duct; *So.*, somatopleure; *S.p.*, splanchnopleure; *p.p.*, pleuro-peritoneal or cœlomic cavity; *c.h.*, notochord; *a.o.*, dorsal aorta. The section shows the middle germ layer partially separated into the mesoblastic somite and the lateral plates, which embrace the cœlome between its lamellæ.

to the origin of the Wolffian ducts. They are generally believed to be of mesoblastic origin, and this is the view held by the Hertwigs. Kölliker, however, long ago insisted on their epiblastic origin, and such high authorities as His and Minot now support his conclusion.

Many otherwise unaccountable anatomical and pathological phenomena can be explained on this hypothesis, especially the skinlike structure of the vaginal lining membrane.

The earliest manifestation of the Wolffian duct is a longitudinal cellular cord, which appears before the end of the third week of embryonic life as a projection beneath the

epiblast of the body wall, occupying a position between the protovertebral somites and the somatic mesoblast (Fig. 1, *W.d.*).

As growth progresses, the rudimentary duct sinks away from the epiblast downwards into the uncleft somatic mesoblast; and when the latter grows outwards towards the pleuroperitoneal cavity, the duct is found within a projection —the Wolffian ridge (Fig. 2, Ex)—immediately beneath the peritoneum (Fig. 2, W.D). This part soon becomes hollowed

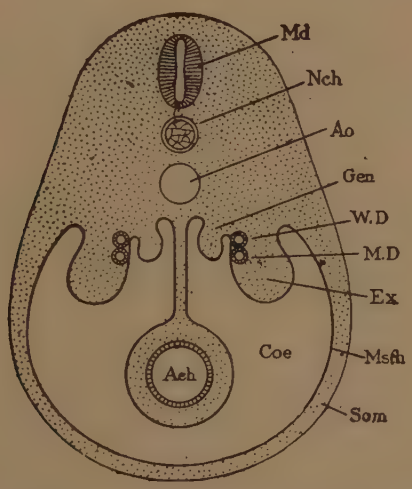

FIG. 2.—DIAGRAMMATICAL CROSS-SECTION OF A VERTEBRATE TO SHOW THE RELATIONS OF THE FUNDAMENTAL PARTS OF THE UROGENITAL SYSTEM. (MINOT.)

Md, Medullary tube; Nch, notochord; Ao, aorta; Gen, genital ridge; W.D, Wolffian duct; M.D, Müllerian duct; Ex, Wolffian ridge; Msth, cœlomic epithelium; Coe, cœlom; Som, somatopleure; Ach, archenteron.

out, and the structure is completed by the proliferating cells of its posterior extremity growing backwards as a solid column (into which the lumen gradually extends) until it reaches the cloacal section of the hind-gut.

While these changes are in progress, tubular and glomerular structures appear in the blastema connected with the anterior part of the duct, with which they are soon found to be in

communication. Thus the Wolffian body is evolved, which during embryonic life functions as a kidney.

At about the same time the cœlomic epithelium covering the mesoblastic somites, on either side of the mesentery, assumes a thickened opaque aspect, owing to its single layer of flattened cells acquiring there columnar form and multilaminar disposition (Fig. 3, *a'*). This constitutes the genital

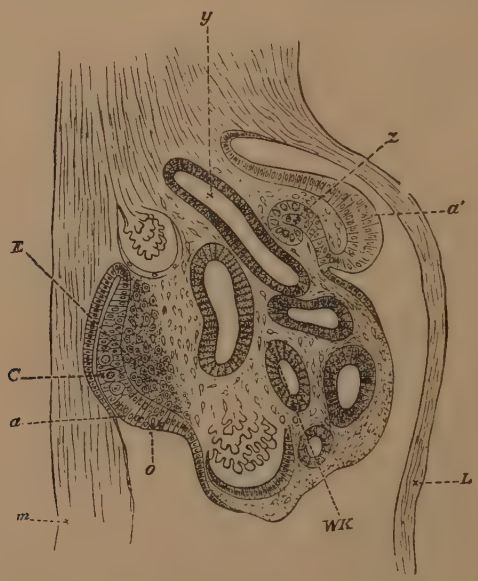

FIG. 3.—TRANSVERSE SECTION THROUGH THE WOLFFIAN BODY, RUDIMENT OF THE MÜLLERIAN DUCT, AND SEXUAL GLAND OF A CHICK OF THE FOURTH DAY. (WALDEYER.)

z, Müllerian duct being formed by invagination from the germinal epithelium (*a'*); *WK*, Wolffian body; *y*, Wolffian duct; *a*, germ epithelium; *C*, *o*, primary sexual cells; *E*, stroma of the sexual gland; *m*, mesentery; *L*, somatopleure.

ridge (Fig. 2, Gen), whence the essential elements of the sexual glands—spermatozoa or ova, as the case may be—are essentially derived.

It is worth noting that this metamorphosis of the epithelium, besides affecting the whole genital ridge, spreads also for some distance on either side of it. It is from

cœlomic epithelium, thus modified, that the Müllerian ducts are derived.*

Each duct originates, close to the outer side of the Wolffian body, by three successive groove-like involutions of the cœlomic lining membrane (Fig. 3, *z*). As these sink into the adjacent mesoblastic substance, they gradually become sequestrated from the cœlomic membrane and develop a lumen (Fig 2, M.D).

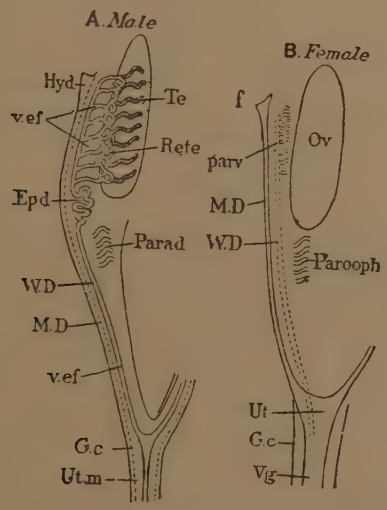

FIG. 4.—DIAGRAM ILLUSTRATING THE HOMOLOGIES OF THE SEXUAL APPARATUS. (MINOT.)

Hyd, Hydatid; v.ef, vasa efferentia; Epd, duct of epididymis; W.D, Wolffian duct; M.D, Müllerian duct; G.c, genital cord; Ut.m, uterus masculinus; Te, testis; Rete, rete Halleri; Parad, paradidymis; f, fimbria; parv, parovarium or epoöphoron; Ut, uterus; Vg, vagina; Ov, ovary; Parooph, paroöphoron.

At this stage the nascent duct consists of a convoluted tube, communicating by three groove-like apertures with the cœlome. Its solid posterior end extends for a short distance beyond the hindermost of these apertures, where it comes into contact with the Wolffian duct. By the proliferation of

* Some embryologists still describe these ducts as arising from the mesoblast, and others as being derived from the Wolffian ducts by delamination.

these terminal cells it grows backwards until it reaches the cloaca, and a lumen gradually develops in it.

This indeterminate condition of the rudimentary sexual organs begins to pass away early in the third month, when differentiations indicative of the predominance of the male or female type manifest themselves.

In the latter case the sexual glands become ovaries, and from the Müllerian ducts the uterus and Fallopian tubes evolve.

The details of the process are briefly as follows: Of the three openings into the front part of the Müllerian duct, the anterior one alone persists, constituting the ostium abdominale tubæ, from the margins of which the funnel-shaped fimbriated

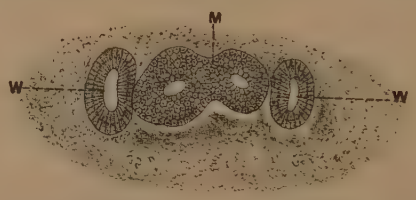

FIG. 5.—CROSS-SECTION THROUGH THE GENITAL CORD. (TOURNEUX AND LEGAY.)

Showing commencing fusion of the Müllerian ducts (M), each of which has a Wolffian duct (W) on its outer side.

extremity of the Fallopian tube is evolved (Fig. 4, f; Fig. 6, *t'*). The occasional occurrence of accessory ostia is due to failure of one or both of the posterior apertures to close. The atrophied anterior extremity of the Müllerian duct is represented in the adult by the unstalked hydatid of Morgagni. The next succeeding part of the duct becomes the Fallopian tube. The junction of the latter with the uterine cornu is indicated by the insertion of the round ligament, which is formed from the ligament of the Wolffian body. The uterine cornu is evolved from that segment of the duct comprised between the insertion of this ligament and the upper end of the genital cord.

This structure is formed by the approximation of the posterior segments of both Müllerian and Wolffian ducts,

which are here embedded in a thick sheath of mesoblast (Fig. 4, G.c). The Müllerian ducts lie close together in its posterior median part, each having the Wolffian duct of the corresponding side near its antero-external aspect (Fig. 5).

It is out of these structures that the rest of the uterus and the vagina are evolved by a process of fusion. This begins at about the end of the third month by the union of the lower portions of the Müllerian ducts, and from the extension of this process upwards and downwards a single median utero-vaginal canal results. According to Tourneux and

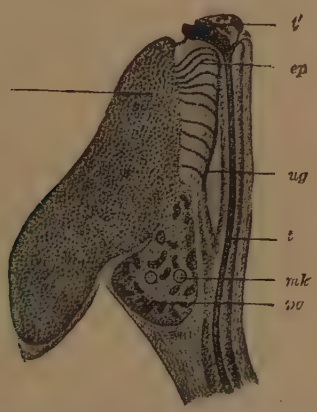

FIG. 6.—INTERNAL SEXUAL ORGANS OF A FEMALE HUMAN EMBRYO 9 CENTIMETRES LONG. (WALDEYER.)

ei, Ovary; *t*, Müllerian duct; *t'*, ostium abdominale tubæ; *ep*, epoöphoron (sexual part of Wolffian body); *pa*, paroöphoron (secretory part of Wolffian body); *mk*, Malpighian bodies; *ug*, Wolffian duct.

Legay, the Wolffian as well as the Müllerian ducts take part in this fusion.

While these events are progressing, the Wolffian bodies and the ducts atrophy; and, as a rule, most of these structures eventually disappear, with the exception of some vestiges.

In the adult female, the tubular structures of the epoöphoron (organ of Rosenmüller, or parovarium) are the remains of its upper or genital part (Fig. 6, *ep;* Fig. 4, parv), of which the male homologue is the epididymis (Fig. 4, v.ef). The scanty

remains of its lower glomerular or secretory part may be found embedded in the hilum of the ovary, where they constitute the paroöphoron, which is homologous with the organ of Giraldès in the male (Fig. 4, Parooph; Fig. 6, *pa*).

With regard to that segment of the Wolffian duct which is not included in the genital cord, its anterior part atrophies, and all that persists of it is represented in the adult female by the longitudinal tube of the epoöphoron (Fig. 4 B., W.D; Fig. 6, *ug*); the posterior part of this segment—viz., that which is free in the broad ligament—as a rule, completely disappears, but occasionally it is represented by an atrophied rudiment, or even by a tubular structure. The persistent Wolffian duct of the human female is the analogue of Gärtner's duct of the cow and sow, its male homologue being the vas deferens.

Tourneux and Legay describe the inferior segment of the Wolffian duct as being easily recognisable, embedded in the lateral wall of the utero-vaginal canal, during the latter part of the third month. Early in the fourth month they could still trace it as a string of yellowish cells, with bead-like dilatations here and there. By the end of the fourth month it was represented only by a few small, solid, cellular masses, which soon afterwards disappeared.

At the middle of pregnancy Dohrn found the duct embedded in the substance of the uterus, at a point where the internal os would subsequently appear, and thence it passed downwards towards the anterior part of the vaginal vault. The degree of obsolescence is very variable. When one or both ducts persist, the terminus is just within the upper part of the vagina. In some cases of this kind the main duct has been observed to give off a branched diverticulum to the cervix just before entering the vagina.

The part played by the Wolffian ducts in the development of the vagina is still a moot question. According to Berry Hart, they enter largely into its formation, the skin-like membrane lining this organ being derived from them.

It is well to remember also that the ureter arises as a dorsal outgrowth from the hinder part of the Wolffian duct,

and it is the first distinctly renal (metanephritic) structure to appear. It soon loses its Wolffian connection, and acquires an independent opening into the cloaca.

During early embryonic life, the newly-formed utero-vaginal canal—at first solid—is lined throughout by stratified columnar epithelium. In its upper segment this stratification subsequently disappears, so that by the sixth month only a single layer remains; in its lower segment, however, stratification is maintained, but the cells become flattened and polyhedric. Between these two zones there is an extensive transitional area. Nagel, however, maintains that from the first the cells of the inferior segment are shorter and flatter than those lining the rest of the canal.

Throughout the fourth month there is no obvious demarcation between uterus and vagina; but early in the fifth month this differentiation commences, by a circular outgrowth arising from the solid mass of cells, which occupies what corresponds to the upper part of the vagina. This outgrowth, by burrowing into the cells of the adjacent genital canal, a little below the level of the zone of epithelial transition, sculptures in it the first rudiment of the portio vaginalis.

About the middle of the fifth month a prominence appears, whence the anterior lip of the os uteri is evolved; and a little later the rudiment of the posterior lip appears. Thus the os uteri is differentiated by the beginning of the sixth month. Even in well-developed individuals the fusion of these lips is often incomplete, and sometimes it quite fails, hence bilateral fissures. Fischel has demonstrated instances of this kind in newly-born infants. Probably many so-called lacerations of the cervix are really due to congenital flaws of this kind.

At the middle of the fourth month the nascent uterus is two-horned, but by the subsequent consolidation of the cornua with the rest of the corpus the organ gradually acquires its typical shape. During the sixth month the walls of its inferior segment become markedly thickened, owing to rapid growth of the musculature, and at a rather later period

this thickening extends to the rest of the organ. A well-marked groove (isthmus, os internum) appears at about this time, which indicates the limit between cervix and corpus. During intra-uterine life the cervix is much longer, larger, and thicker than the rest of the organ.

Muscle cells begin to appear immediately beneath the epithelium during the latter part of the fourth month, Müller's ducts having no proper muscular investment of their own. Rösger describes the embryonic mesoblastic cells surrounding the newly-formed utero-vaginal canal as soon separating into two layers: from the outer of these—in which spindle cells predominate—the musculature originates, in close connection with the intramural bloodvessels; while the inner layer gives rise to the subepithelial or decidual tissue, which consists of irregularly-shaped cells embedded in granular amorphous matter.

According to Sabotta, however, the musculature is derived from a layer of circular fibres, which evolves in close connection with the mucosa from the mesoderm of Müller's duct. An external layer of longitudinal fibres, derived from the broad ligament, is subsequently added. Werth and Grusden confirm Sabotta's views. They found that at first the musculature consisted only of circular fibres (archimyometrium), to which was afterwards added an external layer (paramyometrium) of longitudinal and oblique fibres derived from the adjacent connective tissue; and between these a thick middle layer developed in connection with the intramural bloodvessels.

Thus, the development of the uterine musculature is closely associated with that of its bloodvessels. These are at first simple cellular tubules, outgrowths from pre-existing adjacent vessels; but, as development proceeds, they receive copious investments of muscular elements, which play an important part in regulating the blood-supply.

J. Williams maintains that the greater part of the uterine musculature evolves in connection with the mucous membrane in a manner analogous to that of the muscularis mucosæ of the alimentary canal. In early embryonic life he

has found this portion separated from the rest of the uterine wall by a layer of loose connective tissue, in which the chief vascular branches are embedded, as in the fully-formed uteri of some of the lower animals; but in the adult human female only traces of such a separation could be made out. He describes the proper uterine musculature as consisting of the thin layer immediately beneath the peritoneum, which is mainly composed of longitudinal fibres.

It is not until about the sixth month that the distinction between mucosa and musculature is well established. At this period the mucosal stroma consists of numerous polyhedri cells, embedded in granular amorphous substance, together with numerous bloodvessels. During the sixth month the first traces of uterine glands begin to appear as tubular involutions of the single-layered, cylindrical-celled lining membrane. These first appear in the region of the cervix, and are the rudiments of the cervical glands.

Plications of the lining membrane of the nascent organ—the first rudiments of the arbor vitæ—begin to appear in the cervix during the fourth month. These subsequently increase, and spread to the fundus, persisting throughout embryonic life.

By the eighth month the transitional zone between the cervical and vaginal mucosa has become much narrowed.

At the commencement of the ninth month the epithelium of the cervix undergoes the so-called mucous transformation: its cells elongate; their protoplasm becomes transparent, and can no longer be stained either by logwood or picrocarmine; their large, easily-stained nuclei, instead of each occupying the middle of its own cell, are now found only near their deep ends. This change indicates the supervention of secretory activity. At birth all the cervical epithelium has undergone this change, numerous glandular follicles have developed from it, and the canal is filled with a thick mucous plug.

In marked contrast with this, no glandular structures whatever can be found in the mucosa of the corpus at birth; these structures are entirely of post-embryonic formation.

During embryonic life the epithelia of the cervix and corpus are both alike destitute of cilia (De Sinéty, Guyon, etc.).

The newly-formed portio vaginalis is at first coated with a smooth layer of stratified epithelium, of which the superficial cells soon assume the flattened, squamous form. Subsequently, by the ingrowth of innumerable small solid plugs of epidermoidal cells, its smooth surface, like that of the vagina, becomes roughened from the formation of numerous papillæ. It is not until after birth that these structures become embedded and covered over with squamous epithelium as in adult life.

The developmental history of the mucosa of the portio and cervix is described in Chapter IV.

No part of the organism undergoes such remarkable post-embryonic developmental changes as the uterus; even the mammæ only approximate to it. At birth its appearance is very different from that of its adult form. The cervix then constitutes its most bulky part, its length being double that of the body. The os externum is relatively large, the anterior lip being larger than the posterior, as in the embryo. The plications of its lining membrane now fall a little short of the fundus.

During the early years of post-embryonic life, while the rest of the organism is growing so rapidly, the uterus remains comparatively quiescent—its walls thicken a little, and the plications gradually disappear from the corpus.

At this period glandular structures begin to be formed in its mucosa, by the ingrowth of processes of the surface epithelium into the subjacent stroma.

The date at which cilia appear has yet to be determined.

As puberty approaches there is a great change: the whole organ enlarges, the proportionate increase of the corpus much exceeding that of the cervix, so that the former soon attains double the size of the latter. The development of the glandular structures now proceeds apace. This great increase of the corpus coincides with the establishment of menstruation; and at each subsequent catamenial period there is a certain recrudescence of developmental activity.

Under the influence of pregnancy the organ undergoes hypertrophic metamorphosis of the most extraordinary kind. In the whole range of post-embryonic developmental phenomena there is nothing to equal it. Thus, while the unimpregnated uterus weighs only about 1 ounce, and is 2½ inches long, at the full term of pregnancy it has grown so immensely as to weigh 25 ounces or more,* and its length has increased to at least 12 inches. This metamorphosis commences even before the fertilized ovum reaches the uterus, and it continues until delivery, the corpus being the part chiefly affected. Although the stress of this process falls mainly on the muscular and mucous layers, yet all the constituents of the organ participate in it. The muscle cells become greatly enlarged as well as increased in numbers. This new formation takes place chiefly in the inner layers, ceasing at about the end of the sixth month. The changes in the mucosa and its glands are analogous to those that precede menstruation, but they are more pronounced and extensive. Their outcome is the formation of the decidua, whose peculiar function is the nourishment and protection of the developing ovum.

After parturition retrogressive changes set in, which rapidly reduce the enlarged organ to comparatively small size; but the virginal condition is never regained, the organ remaining permanently enlarged to the extent of double or treble its former bulk. In proportion to the number of accouchements the length of the portio vaginalis diminishes, and in those who have borne many children it may eventually disappear.

As the climacteric obsolescence commences, the musculature atrophies, the wasting being most marked in the external layers; the endometrium is much altered, the cellular elements disappearing from its deeper layers, which are reduced to a cicatricial mass; many of the epithelial cells lining the utricular glands also disappear, and those remaining show degenerative changes; moreover, the walls of the arterioles become much thickened.

Similar changes are induced by removal of the ovaries.

After the climacteric the uterus shrinks yet more, becoming

* According to Cruveilhier, the increase is from 45 to 1,500 grammes.

paler and firmer. As age progresses atrophic changes continue, with marked decrease in the size of the organ, especially of the portio. Thus, the organ may be at last reduced to even a smaller size than it had in infancy.

To sum up, in the life-history of the uterus the following stages may be recognised: (1) Origin of the Müllerian ducts in the first month; (2) canalisation and commencing union of the lower end of these ducts in the second and third months; (3) further coalescence from the third to the fifth month; (4) gradual disappearance of the septum in the fourth and fifth months; (5) the fœtal uterus is evolved in the sixth to the tenth month; (6) the formation of the infantile uterus from the first to the twelfth year; (7) the pubescent or virginal uterus is formed from the thirteenth to the seventeenth year; (8) the puerperal uterus is evolved with the advent of pregnancy; (9) the post-puerperal uterus is the condition resulting after delivery; (10) the post-climacteric or senile uterus, which begins to be formed after the establishment of the menopause.

CHAPTER III

ANATOMICAL MEMORABILIA

In order to understand the pathology and treatment of uterine neoplasms, it is necessary to bear in mind certain anatomical details, which are generally passed over cursorily or not mentioned at all in treatises on anatomy.

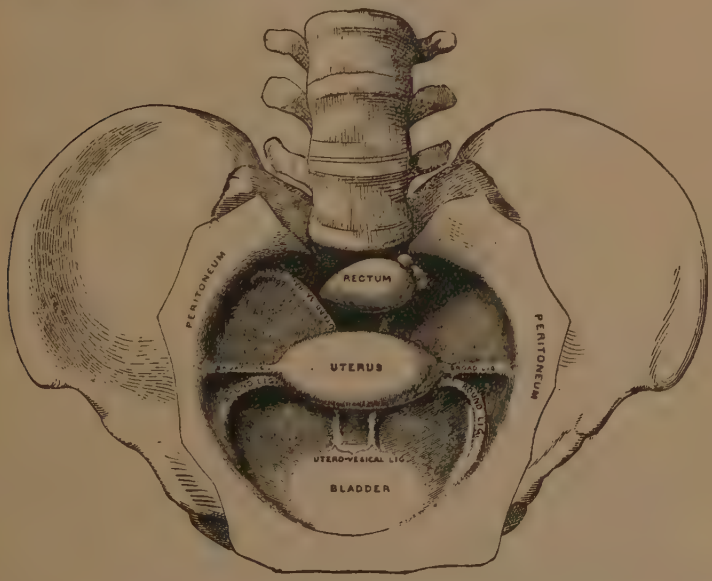

FIG. 7.—THE RELATIONS OF THE UTERUS, SHOWING THE REFLECTIONS AND POUCHES OF THE PELVIC PERITONEUM. (HODGE.)

The uterus is situated in the middle of the pelvis, having the bladder in front and the rectum behind. It is, so to speak, implanted on the top of the vagina. The folds of the

broad ligament enclose it, and furnish it with an almost complete peritoneal investment. Over the upper part of the organ this covering is firmly adherent; elsewhere it is but loosely attached.

Anteriorly, at the level of the isthmus or os internum, the peritoneum is reflected from the uterus to the bladder. In this vicinity it is so loosely attached that it can easily be

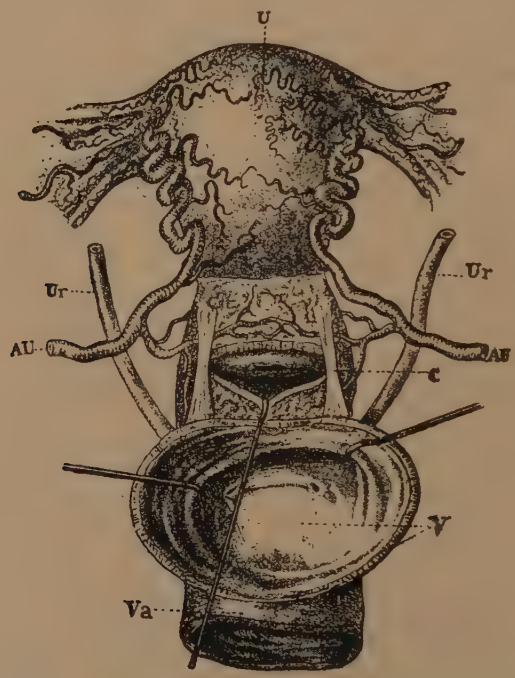

FIG. 8.—DISSECTION SHOWING THE RELATIONS OF THE UTERUS AND VAGINA WITH THE BLADDER, URETER, AND UTERINE ARTERY. (POZZI.)

U, Uterus; Va, vagina; C, cervix; V, bladder, Ur, Ureter; AU, uterine artery.

stripped off with the finger. Posteriorly, the peritoneum covers the whole of the uterus, and it is prolonged for about $\frac{3}{4}$ inch over the adjacent part of the vaginal wall, whence it is reflected upwards over the rectum, forming Douglas's pouch (Fig. 7).

The chief supports of the organ, by which its fixity is secured, are the utero-sacral ligaments—two stout bands of organic muscle covered by peritoneum—which pass on each side from the upper part of the cervix to the third sacral vertebra (Fig. 7).

Beneath the utero-vesical pouch, in close connection with the anterior wall of the cervix, is the posterior wall of the

FIG. 9.—SHOWING THE RELATIONS OF THE URETER, BLADDER AND URETHRA TO THE UTERUS AND VAGINA. (KELLY.)

The right ureter is seen crossing under the uterine artery at a short distance from the cervix, and entering the collapsed bladder in front. The uterus is above and to the left. The lower part of the figure is made up of the vagina on the left and the urethra on the right, with a slight sulcus between them.

bladder; and lower down the base of this organ rests on the anterior wall of the vagina, the ureters intervening on each side (Figs. 7, 8 and 9).

Ureters.

In their course from the kidney to the bladder, the ureters cross in front of the common iliac artery at or near its bifurcation. This takes place at the margin of the pelvis, opposite the lateral part of each lumbo-sacral joint (Fig. 10, No. 11). This is the rallying-point for finding the ureter, when in the course of abdominal operations, such as hysterectomy for uterine cancer, its pelvic part has to be laid bare and dissected out.

You can determine the position of the artery by feeling its pulsation. To expose it, the peritoneum overlying the vessel above its point of division is pinched up and incised, and the artery is followed downwards until the ureter is found crossing it.

In the pelvis the ureters pass downwards and forwards in front and to the inner side of the internal iliac artery and its anterior divisions.

The ureters first come into close relationship with the uterus at about the level of its isthmus; where, as they converge towards the base of the bladder, they are situated one on each side behind the corresponding uterine vessels—an artery and two veins—at about $\frac{3}{4}$ inch external to the lateral margin of the uterus (Fig. 8, Ur, Fig. 9). Thence they pass forwards along the side of the utero-vaginal canal to the base of the bladder, which they enter obliquely, their level at this point being somewhat in front of the middle of the anterior vaginal wall. In the nulliparous uterus the distance between the opening of the ureter into the bladder and the utero-vaginal junction is from 1 to 2 cm., or about $\frac{3}{4}$ inch. For the last 5 cm. of its course the ureter is closely connected with the posterior wall of the bladder (pars vesicalis), and in every displacement of the bladder this segment of the ureter moves with it. Hence, when the bladder has been freed from the cervix, as in the early stage of vaginal hysterectomy, this organ, together with the ureters, may readily be drawn up with a retractor quite clear of the field of operation.

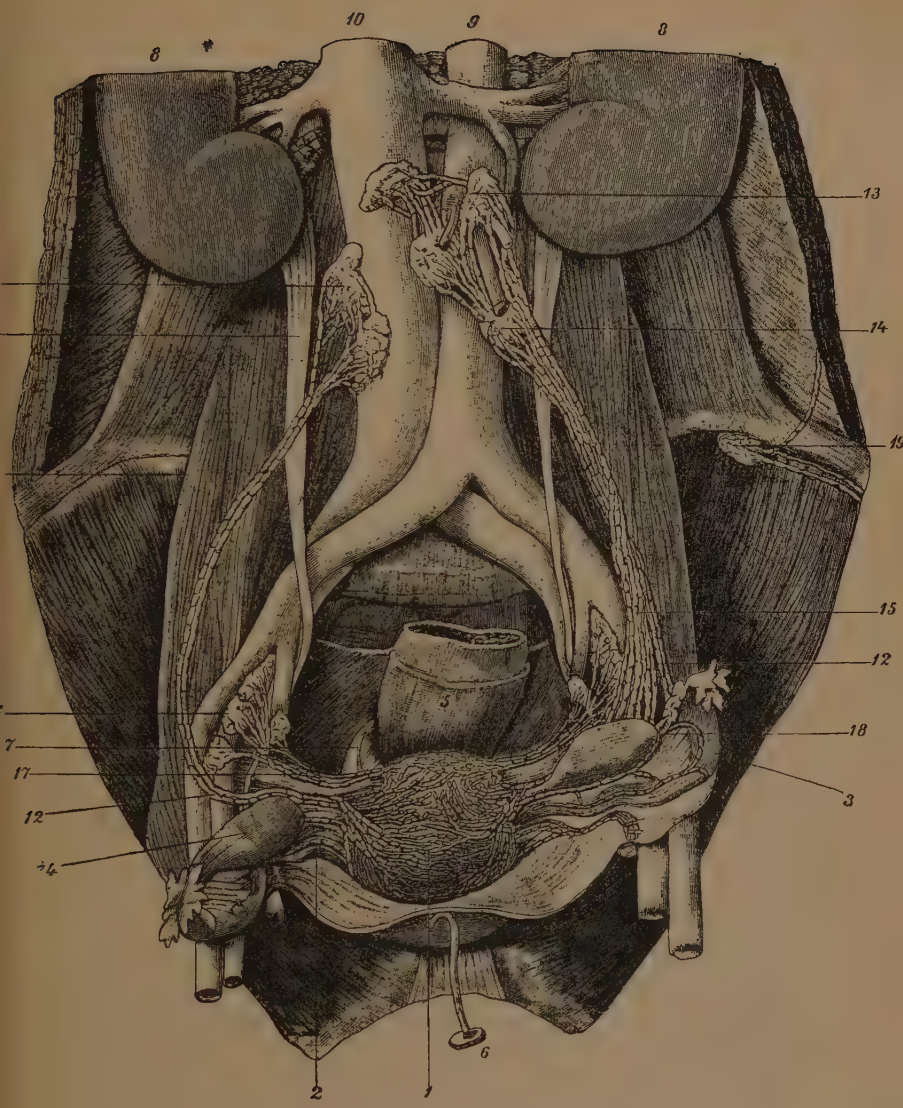

FIG. 10.—THE VASCULAR AND LYMPH SYSTEMS OF THE FEMALE PELVIC ORGANS. (POIRIER.)

1, Uterus; 2, round ligament with its lymphatics; 3, Fallopian tube; 4, ovary; 5, rectum; 6, bladder; 7, utero-sacral ligament; 8, kidney; 9, abdominal aorta; 10, vena cava; 11, ureter; 12, lymph vessels going to—13, lumbar glands; 14, lumbar glands receiving the ovarian lymphatics; 15, ovarian lymph vessels; 16, iliac and hypogastric lymph glands receiving lymphatics from the cervix uteri; 17, lymphatics of cervix uteri; 18, lymphatics of the Fallopian tube; 19, lymph gland of the abdominal wall.

Arterial System.

The frequency with which extensive operations are now undertaken for the removal of uterine tumours, has caused much attention to be directed to the precise distribution of the uterine bloodvessels, for in all such procedures the prevention and arrest of hæmorrhage are matters of the first importance.

The uterus is supplied with blood by the uterine and ovarian* arteries, which, as they run along each side of the organ, give off numerous transverse branches; thus, blood enters the organ at the sides, and not at all at the ends (Fig. 11). Hence, in order to arrest hæmorrhage from the uterus, it is evident that the main trunks in the broad ligament must be ligatured. These vessels are remarkable for their tortuosity. As they lie between the folds of the broad ligament, they are embedded in areolar tissue.

Clark has proved by injections that the anastomoses between the arteries of each side of the uterus are exceptionally free, consisting of direct arterial communications as well as of capillary anastomoses.

The **uterine** artery (Fig. 11, *e*) arises from the anterior division of the internal iliac, whence it runs downwards and inwards in the pelvic connective tissue towards the upper part of the cervix, at which level it crosses over the ureter (Figs. 8 and 9); it then turns upwards between the folds of the broad ligament, and proceeds in this direction along the side of the uterus, where it anastomoses with the descending branch of the ovarian artery (Fig. 11). Vaginal branches are sometimes given off from the uterine artery, but more frequently they spring from the anterior division of the internal iliac itself (Fig. 11, *g g*).

The **ovarian** artery is a branch of the abdominal aorta.

* According to Fredet's anatomical researches, the ovarian arteries only occasionally contribute to the blood-supply of the uterus, and then but scantily to its upper portion. Clinical experience, however, shows that the uterine circulation is much influenced by ligation of the ovarian arteries; and under pathological conditions these vessels are often greatly enlarged and supply the uterus freely.

On reaching the pelvis, it enters the folds of the broad ligament, and runs below the ovary towards the upper angle of the uterus. Before reaching the ovary it lies in the free border of the broad ligament, external to the Fallopian tube (infundibulo-pelvic ligament). Near the upper angle of the uterus it divides into two branches, of which the ascending supplies the fundus, anastomosing with its fellow of the opposite side; while the descending branch passes downwards along the lateral border of the corpus, where it joins the uterine artery (Fig. 11).

FIG. 11.—THE ARTERIAL SUPPLY OF THE UTERUS. (HYRTL.)

a, Ovarian artery, giving branches to the ovary (*c'*, *c'*, *c'*), Fallopian tube (*a'*, *a'*), round ligament (*b*), and uterus (*c*, *d*); *e*, uterine artery, arising from the anterior division of the internal iliac (*f*), giving branches to the cervix, and anastomosing with the ovarian artery.

As the uterine artery approaches the cervix, it gives off one or more transverse branches to this part, which anastomose with corresponding branches from the artery of the opposite side (Figs. 8 and 11). Above this level the uterine artery and the branch of the ovarian with which it anastomoses, give off numerous transverse branches to the lateral margin of the

uterus; these also anastomose with corresponding branches from the opposite side, so that the organ is surrounded by a series of transversely disposed vascular loops. According to J. Williams, the primary branches do not penetrate deeply, being separated from the peritoneum only by a thin layer of the musculature. From these arterial loops branches are given off towards the mucosa in a direction perpendicular to its surface. From the anastomosis beneath the mucosa numerous branches—for the most part perpendicularly disposed—enter the mucosa between the glands, terminating beneath the surface epithelium in capillaries which surround the orifices of the glands. By means of anastomoses between adjacent branches the glands are surrounded by vascular networks; and from these venous radicles arise.

The Venous System.

The uterine veins are numerous and of great size; even independently of pregnancy, their capacity much exceeds

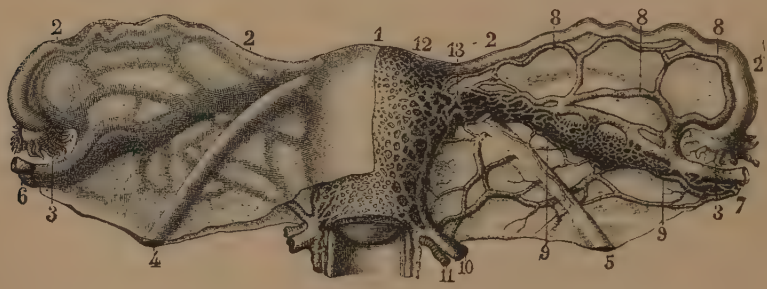

FIG. 12.—THE VENOUS SYSTEM OF THE UTERUS. (SAPPEY.)

1, Anterior surface of uterus, right half covered by peritoneum—on its left half the utero-ovarian venous plexus is displayed; 2, 2, Fallopian tubes; 3, 3, pavilion of the tubes; 4, right round ligament covered by peritoneum; 5, left round ligament with its uterine part cut away to show anastomosis of the uterine and utero-ovarian veins; 6, utero-ovarian vessels covered by peritoneum; 7, dissection of these vessels; 8, 8, 8, veins included in the meso-salpinx; 9, venous plexus of the hilum of ovary; 10, uterine veins; 11, uterine artery; 12, venous plexus covering the surface of uterus; 13, anastomosis of uterine with utero-ovarian veins.

that of the arteries. They communicate freely with one another and with branches from adjacent plexuses, but the

veins of the corpus are more intimately connected with one another than with those of the cervix.

The pelvic veins are for the most part destitute of valves; hence the whole system can be injected through any of its larger branches. The general disposition of the uterine veins corresponds to that of the arteries. They emerge from the uterus on each side of the organ, and the blood is carried off chiefly by the ovarian veins, which discharge on the right side into the inferior vena cava, and on the left side into the left renal vein.

Between the uterine, ovarian, vaginal, vesical, and hæmorrhoidal venous plexuses there is free communication, and through the superior hæmorrhoidal vein, which discharges into the portal system, communication is established between the systemic and portal circulations. By means of branches passing along the round ligament, communication is also established with the subcutaneous veins of the groin and the external genital system.

In the folds of the broad ligament are numerous large veins which carry off the blood from the cervix and lower part of the corpus. In the uterine musculature many veins open into large sinuses, whose walls are intimately blended with the surrounding uterine tissues, and with these sinuses capillaries communicate. This condition becomes very prominent during pregnancy, when the uterine venous system undergoes enormous development.

Lymphatic System.

The anatomy of the uterine lymphatic system is so intimately associated with the morphology of cancer, that it will be more convenient to describe it in that connection (Chapter XV.), rather than here.

Innervation.

The **nerves** of the uterus are derived chiefly from the hypogastric plexus of the sympathetic, which is situated between

the common iliac arteries. Its branches are reinforced by offsets from the lumbar and sacral ganglia and the sacral nerves.

Their exact mode of termination has not yet been definitely made out. Frankenhaüser describes them as forming networks in the mucosa consisting of amyelinic fibres, whence filaments penetrate the utricular glands, and are lost between the epithelial cells lining their interior. In the musculature the same observer traced filaments to the nuclei of the muscle cells.

According to Herff, the nerves, by continuous dichotomous division, but without anastomosis, form meshes around the bloodvessels, and give branches to the muscle fibres, whence filaments pass to the nuclei of the muscle cells, each offset coming into contact with several nuclei before it terminates in one of them.

Rein has demonstrated nervous ganglia on the surface of the muscle bundles, and even in their interior.

CHAPTER IV

THE HISTOLOGY OF THE UTERUS IN RELATION TO ITS NEOPLASTIC PATHOGENY

The Portio Vaginalis.

In this chapter I propose to set forth the chief facts concerning the histogeny of uterine neoplasms. My endeavour will be to indicate briefly the steps by which from the normal the abnormal has arisen. Hence I shall often have to refer to the details of normal histology.

By the term 'portio vaginalis' I understand that part of the inferior segment of the uterus which projects into the vagina, and is covered with squamous epithelium. It comprises all structures between the os externum and the vaginal fornix.

In its structure the portio differs from the rest of the uterus, resembling rather the vagina. Similarly, in its proclivity to neoplasms, it likewise takes after the vagina. In nulliparæ the portio presents as a smooth, rounded, or somewhat cone-shaped mass, having a small depression at its centre, which is the inferior orifice of the cervical canal—the os externum. The latter consists of an anterior and posterior lip, united by thick commissures; of these the anterior appears to be the larger and more prominent, owing to the uterus having normally a forward inclination. In multiparæ the portio is less prominent; the os is larger and of irregular shape; while its lips are often rugose or lobulated, presenting scars and fissures, the result of injuries connected with parturition.

As the portio projects into the vagina, it is capped by an upward extension of the vaginal lining membrane. This cap, like the vaginal mucosa itself, is structurally analogous to the epidermis, except that, like the mucosa, it contains neither glands nor hairs, and cornification is defective. In all probability the cells of its Malpighian layer are also poor in pigment;* at any rate, melanotic neoplasms arising from this part are of extreme rarity. Embedded in the rete mucosum are numerous minute filiform or clavate papillæ, containing vascular loops. A single layer of cylindrical epithelial cells, set perpendicularly, lines each papilla and the intervening depressions. In the fœtal state, and even in early infancy, the extremities of these papillæ project beyond the free surface; but at other periods they are covered over by a thick layer of stratified flattened epithelium. The intervening cellular layers manifest the usual epidermoidal polymorphism, and prickle cells are abundant; these cells anastomose freely with one another. Beneath the epidermis is the corium, which consists chiefly of fibrous tissue—poor in cellular elements—in which elastic tissue abounds; moreover, some bands of organic muscle are irregularly distributed in it. Detached 'epithelial pearls'—rests of the epidermis—abound in and beneath the corium and adjacent structures.

The membrane of the portio, like that lining the vagina, secretes an acid mucus; whereas the cervical secretion is alkaline. This secretion of the portio, however, is not a glandular product, for, as previously mentioned, no glands are found in this connection; it results, rather, from the deliquescence and shedding of the superficial epithelial cells.

So insensible is the portio to ordinary stimuli, that it may be cut or cauterized without causing pain; hence the question has been asked whether it is not altogether devoid of nerves, which most of those who have specially

* Barnes has reported an interesting instance of pigmentation of the portio, consequent on its exposure through prolapse. The lining of the exposed part had become dry, skinlike, and blackened, whereas that not exposed remained pink, moist, and non-pigmented. The patient was a Hindu, aged fifty. The pigment was found to consist of dark-brown granules, which were most abundant in the deeper cells of the epidermis.

studied the subject have answered in the negative. The portio is less vascular than any other part of the uterus, and it is alleged to receive even less blood in the gravid than in the non-gravid state. It is also less abundantly supplied with lymphatics than the rest of the organ. Another peculiarity of the portio is that it is richer in fibrous and elastic tissue, but much poorer in muscle elements, than any other part of the uterus.

In the development of papillated structures, like the portio and cutis vera, the epidermis plays an important part. It causes these structures to arise by processes of its proliferous cells growing into the subjacent connective tissue. The chief morphological feature that marks the transformation of simple epithelial hyperplasia into epithelial cancer, consists essentially in an indefinitely-sustained, superinduced repetition of the above process. Just in the same way cancer of the portio begins, by proliferous cells of the interpapillary region of the rete mucosum, growing into the subjacent fibrous stroma, forming at first knobby projections and subsequently ingrowing columns. These cells multiply and develop in semi-independence, regardless of the requirements of adjacent parts and of the organism as a whole. In the less grave form of the disease the new formation does not progress beyond this initial stage. The ingrowing cells preserve their normal form, and their mutual arrangement is but little altered; the ingrowing columns fail to penetrate deeply; the malady progresses slowly, and dissemination is rare. This is the tubular variety. In the graver form, the departure from the normal is more decided; changes take place in the grouping of the cells, and 'nests' are formed; the ingrowing columns increase rapidly and penetrate deeply; they branch and anastomose, and sooner or later there usually is dissemination. This is the lobular variety.

Such are the varieties of cancer that arise from the portio, properly so called; but, in addition to these, other forms of cancer also take origin from this part. Under certain pseudo-pathological conditions, which I will now proceed to describe, the cylindrical epithelium of the cervix encroaches upon the

epidermis-covered territory of the portio, and from this foreign element cylinder-celled cancers arise, analogous to those that spring from the cervix. So common is this invasion of the portio that the majority of its cancers originate from this source.

It seems probable that most of these aberrant elements are the outcome of developmental irregularities. At an early stage of embryonic life the upper part of the vagina, as well as the cervix, is lined by cylindrical epithelium. In the subsequent transformation to the flattened variety, minute islets of the original cylindrical cells may still persist unchanged. Klotz and others have demonstrated conditions of this kind in adults; while Fischel has shown that, in young infants, cylindrical epithelium is usually found occupying the portio for a considerable distance beyond the os externum.

An analogous condition results from the invasion of the portio by offsets of the cervical glands (the so-called 'erosions'), which so frequently appear during post-embryonic life in consequence of hyperplastic changes; as well as from the somewhat similar state that ensues from partial prolapse ('ectropion') of the cervical mucosa, whether merely the result of tears, etc., during parturition, of cystic disease, or of other pathological states. Moreover, the minute cysts ('ovula Nabothii') so frequently met with in the lower part of the uterus, which are obviously sequestrations from the glands of the cervix, must also be borne in mind, for cancers have been shown to originate from them.

Recent researches indicate that these acquired forms of heterotopia, like those previously mentioned, are also really of congenital origin, the inherent flaw simply being made manifest by the supervention of other pathological changes. Even 'lacerations' may often be of embryonic origin, for Fischel has demonstrated the occurrence of congenital fissures in exactly the situations usually occupied by these so-called lacerations.

Such are the cellular elements that play the chief rôle in the histogenesis of uterine cancer. The stages of the process

by which from these aberrant cylindrical cells glandular cancers develop are identical with those by which the disease arises from the glands of the cervix, and they will be described when treating of cervical cancer.

Similarly, aberrant epidermoidal cells are often found at some distance from their normal habitat, the mucosa of the portio. In young nulliparæ the line of junction between the epidermoidal cells of the portio and the cylindrical cells of the cervix coincides with the os externum. In multiparæ, however, the os is seldom thus circumstanced, for in them the flattened cells of the portio are prolonged for a variable, often considerable, distance within the cervical canal; and islets of these structures may be met with in the cervical mucosa. Villiers and Thérèse have lately described an instance of this kind, in which islets of epidermoidal cells with Malpighian stratum, etc., were found in the midst of the cervical mucosa, where they presented as whitish plaques. In exceptional cases similar structures have been found even in the mucosa of the corpus (Ries, Zeller, etc.). It is from these aberrant elements that primary epidermoidal-celled cancers of the cervix and corpus arise. In the latter situation this variety of cancer is decidedly rare, but examples of it have been reported by Gellhorn, Flaischlen, Piering, Gebhard, and others.

Pathological conditions in the portio, giving rise to epidermic proliferation but slightly in excess of the normal, cause papillomata to arise. Under these circumstances the epidermis and the interpapillary processes become hypertrophied, encroaching just a little on the subjacent dermis, which in its turn becomes more or less thickened. In new formations of this kind the normal shape, arrangement, and grouping of the cells is maintained, but too many of them are formed. The individuality of such growths is feeble, and they differ but little from local hyperplasias.

Fibro-myomatous and sarcomatous neoplasms of the portio are rare; and in their genesis they present no special differences from similar neoplasms arising from adjacent parts of the utero-vaginal wall.

The cysts that spring from the portio likewise resemble in their origin the corresponding formations of this vicinity.

The Cervix.

The canal of the cervix is a narrow passage, extending from the os externum to the os internum, and by means of it the cavity of the uterus communicates with the vagina. Its shape is fusiform, and its length from 2 to 3 cm. ($1\frac{1}{4}$ inches). The mucosa of this canal is thinner, paler, and tougher than that of the corpus. A striking feature is the numerous folds and rugosities it presents, which together constitute the arbor

FIG. 13.—SECTION SHOWING THE STRUCTURE OF THE CERVICAL MUCOSA. × 40 diameters. (DE SINÉTY.)

a, *a*, Connective tissue; *b*, *b*, muscle bands; *c*, *c*, sections of bloodvessels; *d*, *d*, the ciliated epithelial lining; *e*, *e*, sections of glands lined with calyciform cells.

vitæ. In adult women these usually cease at about the level of the os internum. In this situation, just at the summit of the anterior median column of the arbor vitæ, a small pea-shaped congenital mucosal excrescence often exists in early life. The upper two-thirds of the cervical canal is lined throughout by a single layer of epithelial cells of cylindrical type, whereas a laminated flattened epithelium, which is an

upward extension of that covering the portio, lines more or less of its lower third. The surface of the former part of the mucosa is studded throughout with the minute orifices of numerous glands, which in the virgin have been estimated to number 10,000 (Fig. 13). These secrete thick, viscid, alkaline mucus. They are for the most part simple follicles, but some of them, especially those opening into the depressions between the folds, often present cleft extremities, and occasionally even a racemose arrangement. Ciliated cylindrical epithelium lines the free surface of this membrane; whereas that lining the follicles is non-ciliated; and its cylindrical cells have undergone the mucous or calyciform change, which is indicative of the elaboration of their peculiar secretion.

Among them 'goblet cells' are fairly common. These cells are set perpendicularly in a single layer on a delicate membrana propria, which separates them from the adjacent stroma, a thin layer of longitudinally arranged, flattened spindle cells intervening. They communicate freely with one another by numerous 'ponts intercellulaires,' as Barfurth and others have shown.

The interglandular stroma consists of embryonic connective tissue, of which the characteristic feature is the great number of small round cells it contains. These cells have large ovoid nuclei, with but scanty surrounding protoplasm. They are embedded in a finely granular or homogeneous intercellular substance, in which ovoid cells, spindle cells, and fibrous tissue are found, and even some muscle cells. Proceeding outwards, this tissue gradually merges into the fibro-myomatous structure of the uterine musculature. The mucosa is well supplied with bloodvessels and lymphatics.

In the stroma, quite detached from the surface epithelium and its glandular prolongations, minute vesicular bodies are of frequent occurrence. These are the so-called 'ovula Nabothii,' which are commonest in rather advanced life. They are really minute cysts, containing thick viscid mucus, similar to that secreted by the cervical glands; and they are lined by cells identical with those of the cervical glands,

from which they have evidently been derived by sequestration. Such cysts not infrequently project on the free surface of the portio, the os, and the cervix. In the stroma of the folds of the arbor vitæ muscle bands are often present.

The upper limit of the cervical canal is indicated by the os internum, a slight constriction which marks the junction between the lumen of the cervix and the corpus. It corresponds externally with the narrowing known as the isthmus uteri. It is at about this level that the cervical mucosa merges into that of the corpus.

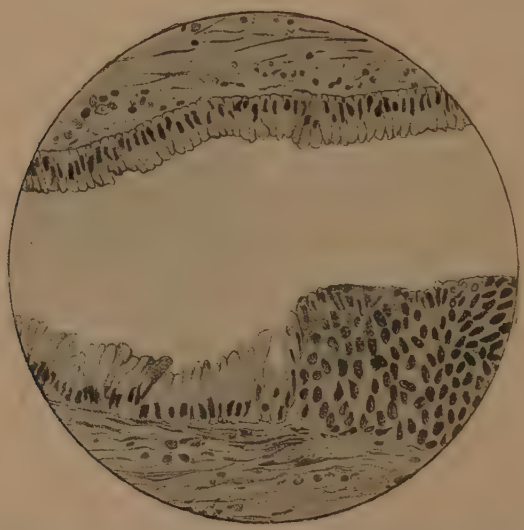

FIG. 14.—HIGHLY-MAGNIFIED SECTION SHOWING THE HISTOGENESIS OF CANCER OF THE CERVIX. (JOHN WILLIAMS.)

Most observers are agreed that the mucous membrane of the cervix does not participate in the catamenial and puerperal changes, except that, like the rest of the sexual organs, it is involved in the concomitant congestion. At these periods, however, the cervical glands secrete an unusually large quantity of their characteristic mucus, and Fritsch maintains that they become greatly hypertrophied.

According to several observers—Küstner, Seigneux, Davidsohn, etc.—the upper part of the cervix for a short distance

immediately below the os internum structurally and functionally resembles the corpus rather than the cervix, participating in the menstrual and puerperal changes.

The cervix is remarkable for the immense number of cancers that arise from its mucosa, nearly 95 per cent. of all uterine cancers being thus derived. Most of these arise from the cervical glands or their aberrant extensions. The lining cells of the affected gland grow and multiply with undue rapidity, and at the same time they become greatly elongated. Cornil has observed their nuclei in various stages of karyokinesis, and individual cells may commonly be seen containing more than a single nucleus.

In consequence of these changes the epithelial cells at the seat of the disease become unduly numerous, and acquire a stratified arrangement encroaching on the lumen of the gland, which they often completely obliterate (Fig. 14). The newly-formed cells lose their typical shape, polyhedric, irregular, and quasi-flattened forms predominating, and cilia are never seen. Thus, the diseased gland is converted into a club-shaped mass of proliferating polymorphic cells, of which only the peripheral layer retains the original cylindrical form. Here and there bud-shaped collections of proliferous cells, pressing on the membrana propria, cause it to bulge outwards, and eventually to disappear; and a similar fate overtakes the layer of flattened cells immediately external to it.

While this is going on, a great concentration of small round cells takes place in the stroma in the vicinity of the morbid process. Meanwhile, solid processes of proliferous epithelial cells sprout out, forming narrow branching columns; which, as they penetrate the adjacent structures, anastomose, forming an irregular network. By the repetition and further extension of this process the cancerous tumour is formed.

Often, even in fully-evolved cancers, the epithelial columns retain their solid form, but in many cases they eventually develop more or less incomplete lumina; and in exceptional

instances the lumen may be lined by a single layer of columnar cells, as in the so-called malignant adenoma.*

It will be gathered from the foregoing, that the process by which these varieties of cancer arise, is but a modified, superinduced repetition of the normal developmental process, an account of which was given in Chapter II.

The extraordinary rapidity and completeness with which the mucosa of the cervix and corpus is regenerated after injury, such as curettage, has lately been made known to us by the researches of Werth, Bossi, and others. These show that its post-embryonic developmental capacity is very great.

Here it may be mentioned that certain forms of hyperplasia, as first demonstrated by Wyss and Friedländer, not infrequently originate newly-formed epithelial structures (the so-called 'erosions'), which are often morphologically indistinguishable from cancer structures. In both instances the epithelial proliferation is decidedly atypical; but whereas in the latter the process is of a malignant nature, in the former it is not so.

The wall of the cervix is a much less bulky structure than that of the corpus, and its musculature is less developed. In the upper part of the cervix the arrangement tends to resemble that of the corpus. There is great irregularity in the disposition of muscle bands, but the predominant trend is transverse. Throughout the rest of the cervix the muscular tissue is concentrated in the peripheral zone, which does not participate in the hypertrophy associated with pregnancy. The muscle bands are knit together by areolar tissue, rich in elastic fibres, but poor in cellular elements. There is an abundant supply of bloodvessels, lymphatics, and nerves.

Sarcomata of the cervix are rather rare, but the mesoblastic elements of the mucosa may originate growths of this kind, as well as those of the cervical walls. Their genesis is similar to that of corresponding growths arising from the corpus.

Certain peculiar forms of sarcomata occasionally arising

* Most of the new formations thus designated by German pathologists really are instances of glandular hyperplasia rather than of cancer.

from this part, with whose structure various heterotopic tissues (cartilage, bone, striped muscle, fat, mucous tissue, etc.) are blended, probably originate from germs derived by sequestration from the matrix of adjacent tissues during early embryonic life. Similarly, certain cysts of this part probably arise from persistent Wolffian and Müllerian remains; but most cysts of the cervix spring from its glandular structures ('ovula Nabothii,' etc.).

Cervical myomata, which are rather rare, are identical in origin with their congeners of the corpus.

The Corpus.

The interior of the corpus uteri is lined by a smooth membrane of grayish or pale pinkish colour, which is very much thicker than the cervical membrane, the maximum thickness being at about its middle. It is covered throughout by a single layer of columnar ciliated epithelium. On examining its surface with a magnifying-glass, an immense number of minute depressions can be seen, which are the orifices of small tubular glands. These glands secrete an alkaline fluid possessing none of the viscid properties of the cervical mucus. The glandular layer is directly adherent to the subjacent musculature, and the attachment is further strengthened by bundles of connective tissue bearing bloodvessels and lymphatics, passing from the intermuscular interstices to the interglandular stroma, the arterial branches being more numerous than the venous ones. Not infrequently the cæcal ends of the gland are quite embedded in the musculature.

In this commingling of glandular and muscular structures, owing to the absence of any intervening connective-tissue stratum or submucosa, the uterine lining membrane differs from all known mucous membranes. Hence many histologists maintain that it is not a true mucosa.

The utricular glands are embedded in embryonic connective-tissue stroma similar to that which surrounds the cervical glands, but with a greater predominance of the small round-celled elements; and they are likewise encased by a layer of flattened connective-tissue cells.

Leopold regards this stroma as a lymphatic reticulum, consisting of fasciculated areolar tissue, of which the constituent bundles, as well as the bloodvessels and the utricular glands, are lined throughout by endothelial cells, which circumscribe intervening spaces; and these he considers to be lymph spaces, containing lymph corpuscles (small round cells, etc.) and lymph.

The glands themselves are slightly flexuous, tubular structures, occasionally branched at their deep ends, where they impinge on the musculature. More than a single gland may discharge from one orifice. Most of them are disposed perpendicularly to the surface, but not infrequently their course is more or less oblique. They are lined throughout by a single layer of columnar epithelium (which according to Friedländer, De Sinéty, and Cornil is ciliated), set perpendicularly on the membrana propria, each gland having a distinct lumen. These cells differ from those lining the glands of the cervix in that none of them present calyciform characters. It will be remembered, as previously mentioned, that these glands are entirely of post-embryonic formation.

Under the influence of certain morbid conditions the utricular glands elongate, become unduly flexuous, and by a process of hyperplastic new formation even penetrate for a considerable distance into the adjacent structures. In such circumstances the lumina usually persist, but sometimes they are completely occluded by the accumulation of their proliferous cells; and in yet other cases the process eventuates in cyst formation. Various kinds of polypi are among the results of this hyperplasia. In these hyperplastic new formations the cilia of the glandular epithelium usually persist, and the layer of flattened periglandular cells is augmented; whereas in incipient cancer both the cilia and the periglandular cells disappear (Cornil).

At each catamenial period the mucosa becomes markedly hypertrophied, presenting a thickened, swollen, œdematous appearance, and there is marked vascular turgescence. In this overgrowth all its constituent structures participate, but

the rapid increase of the subepithelial stromal cells is the most marked feature. There is also concomitant hyperplastic glandular new formation.

According to J. Williams, the menstrual flow is determined by shedding of the hypertrophied mucosa consequent on the fatty degeneration of its constituent elements, which are subsequently completely reproduced from deep-seated portions that escape degeneration.

Möricke and others deny the fatty degeneration, the desquamation, and the regeneration; they regard the flow merely as a vascular phenomenon, a sort of congestive uterine epistaxis.

The neoplastic pathogeny of the corpus uteri is remarkable for its great proneness to originate myomata, over 90 per cent. of all uterine myomata originating from the musculature of the corpus. Malignant disease is rare in this locality, less than 5 per cent. of all such cases arising from the corpus.

It seems certain that most cancers of the corpus uteri originate from the utricular glands, and the steps of the process are so similar to those by which cervical cancers arise that no further account of them need here be given.

Sarcomata of the mucosa arise chiefly from the small round cells of its stroma. Inasmuch as glandular elements are rarely found in such neoplasms, we may conclude that the initial focus of the disease is seldom situated in the immediate vicinity of these structures.

In consequence of conception, remarkable changes take place in the uterine mucosa, which eventuate in the formation of the decidua and placenta. These changes are akin to those that cause the thickening at each menstrual period, but they are much more extensive. Moreover, in the decidua great numbers of large, rounded, or ovoid cells appear—the well-known 'decidual cells.' They are directly developed from the subendometrial connective-tissue cells. These cells are from five to ten times larger than the ordinary small round cells of the mucosal stroma, and each contains a nucleus surrounded by abundant protoplasm (Fig. 15). Decidual cells are characteristic of the gravid state; but, according

to many good observers, they may be met with under other conditions. These proliferating stromal elements compress and push aside the hyperplastic utricular glands, and the superficial epithelium disappears; so neither of these structures takes part in the formation of the decidua, which is essentially a connective-tissue or stromal product. Its function is to furnish a nidus for the developing ovum, in which it soon becomes completely embedded.

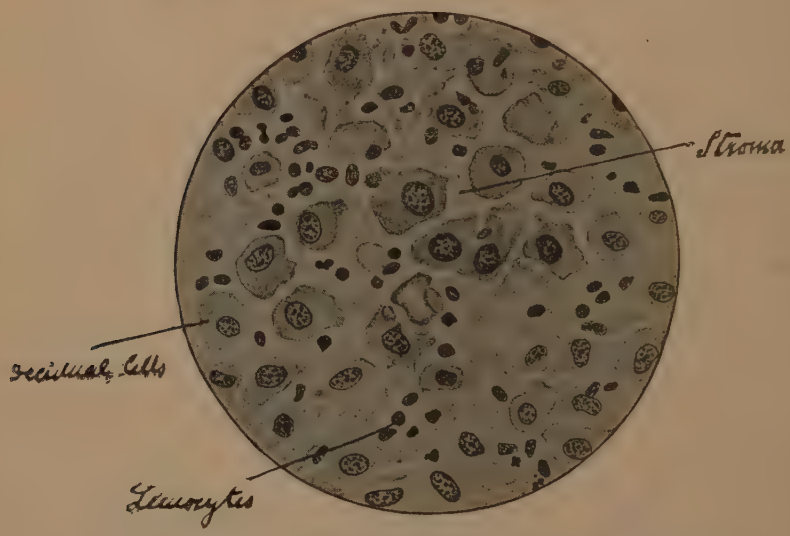

FIG. 15.—SECTION SHOWING THE STRUCTURE OF THE NORMAL DECIDUA. (GRIFFITH.)

At first the whole mucosa is thus affected; but during the third month the process is arrested, and atrophic changes set in, except at one locality—the placental site—where the developmental activity is greatly increased.

At this stage the developing placenta uterina consists of two layers—the cellular (zona cellularum) and the glandular (zona glandularum). The former is next to the fœtus, and consists of large cells of subepithelial origin, of which the more superficial are rounded, and the deeper ovoid or fusiform, with very little intercellular substance; among them giant cells with from ten to forty nuclei may be found.

The zona glandularum is for the most part found near to the uterine musculature; it consists of large and compressed uterine glands, lined with epithelium of a more or less columnar type. The bloodvessels and lymphatics are large and numerous, but nerves are wanting.

As soon as the developing ovum has become embedded in the decidua, it becomes fixed there by numerous small cellular processes, which bud out from the chorion, and push their way into the soft decidual tissues. At first these processes are non-vascular, consisting of epiblastic epithelium of fœtal origin (exo-chorion, syncytium, trophoblast).* It is mainly from this layer, by a kind of budding, that the complicated chorionic villi are eventually evolved. Outgrowths from the allantois, bearing bloodvessels, surrounded by embryonic connective tissue (endochorion), enter these processes, and so complete the villus. During the early stages of development the whole surface of the ovum is covered with these processes. Subsequently they all atrophy, except those connected with that part of the decidua on which the ovum rests (placenta fœtalis), which is usually situated in the vicinity of the fundus uteri. In this situation, both the hypertrophied uterine mucosa and the chorionic villi develop rapidly; the villi interpenetrate the soft hæmorrhagic tissues of the decidua, pushing their way into its vascular channels, there to imbibe nutriment for the fœtus. Thus, by the blending of maternal and fœtal newly formed structures, the placenta is formed, the differentiation being well defined by the middle of the fourth month.

So intimate is the union of these two sets of structures that post-partum the line of separation is not between the maternal and fœtal segments, but through the deeper part of the decidua (zona glandularum). Thus, portions of the

* The histology of the chorionic villi is still being investigated. In an early stage they are lined by two layers of epithelial cells: (*a*) a superficial stratum, or syncytium; (*b*) a deeper stratum—Langhan's layer. The origin of the constituent cells of these layers has not yet been decided. According to Marchand, the syncytial cells are of maternal origin, whereas those of Langhan's layer are derived from the fœtal epiblast; but Marchand's views on this subject are not generally accepted.

decidua and uterine glands are left behind; and these, under normal conditions, furnish the germs whence the mucosa is regenerated. But under abnormal conditions such fragments may persist unduly. The so-called giant cells, that have so often been found in decidual relics, are often embedded trophoblastic buds of the chorion. As a rule, these foreign structures are eventually absorbed; but when this does not happen various morbid conditions may result.

Küstner was the first who demonstrated the presence of islets of placental structures in the mucosa long after delivery. In these decidual elements preponderated—readily distinguishable by their characteristic large cells—each islet being surrounded by a zone of small round cells. In many instances chorionic villosities and proliferating trophoblastic buds have since been detected in relics of this kind. This condition is commonest after premature deliveries; hence it has been called by Fritsch *post-abortum*, or decidual endometritis.

To the somewhat larger and more highly organized residual structures of this kind, that by the proliferation of their elements assume polypoid or tumour-like form, the terms decidual, chorionic, or placental polypus have been applied. Such growths are usually of an innocent nature; hence they have also been designated deciduoma benignum. Even portions of fully formed placenta are often retained long after parturition; and subsidiary placentæ in the form of separate cotyledons may be present and persist post-partum. In some instances psammomatous concretions, such as are not unfrequently met with in the otherwise normal placenta, have been met with in this connection.

It has lately been discovered that malignant neoplasms may originate from these placental residua. Sänger, who was one of the earliest to recognise the decidual element in these growths, at first gave them the name of deciduoma malignum; but, being desirous of emphasizing the fact that they were essentially due to sarcomatous proliferation of the decidual cells, he subsequently suggested instead the term 'sarcoma deciduo-cellulare.' Recent observers have insisted that the essential neoplastic elements are often of

chorionic (fœtal) rather than of decidual (maternal) origin; hence, when the neoplastic proliferation centres chiefly in the trophoblast, they describe the resulting neoplasm as cancer of the chorionic villi, syncytial cancer, etc. It appears to me that the evidence hitherto adduced in support of this view of the matter is far from being conclusive.

The great bulk of the uterine wall consists of unstriped muscle tissue, the muscle elements being firmly knit together, into irregular bands, by connective tissue rich in elastic fibres but poor in cellular elements. The muscle cells are themselves bound together into fibrillæ by amorphous cement substance. Each cell is of tapering, fusiform shape, containing in its centre a large rod-shaped nucleus. During pregnancy these cells become greatly enlarged and augmented in numbers. The arrangement of the muscular bands is exceedingly complicated, for they are irregularly interwoven around the numerous bloodvessels of the uterine wall, especially the arteries, which are remarkable for their thick coats and helicine disposition. The bloodvessels are generally embedded in loose areolar tissue, and they participate in the puerperal hypertrophy. Lymphatics and nerves are abundant. In addition to the foregoing, Farre has called attention to the presence throughout the musculature of small groups of rounded cellular bodies, which he believes to be young muscle cells, for he has traced them through various intermediate developmental stages. These cells are most abundant immediately beneath the mucosa. It is from cells of this kind, grouped around Müllerian and Wolffian 'rests,' that most myomata arise; but this subject will be fully discussed in the next chapter.

Recent researches have shown that the development of the uterine musculature is closely associated with that of its numerous bloodvessels. These at first consist of simple epithelial tubes, which at an early stage of development receive copious investments from the same mesoblastic matrix whence also the musculature is evolved. There can be no doubt that most of the 'rests' whence myomata arise are closely connected with the small bloodvessels of the

uterine wall, as Kleinwächter and Rösger have pointed out; and it is just in such vicinities that the youngest-looking myomatous cells are found.

It is probable that most sarcomata of the uterine wall arise from cellular elements of the perivascular connective tissue of the small bloodvessels. This accords with Ackermann's view, which represents sarcomata as consisting of closely interwoven, anastomosing, fasciculated bundles of cells and fibrillæ, the axis of each fasciculus being a capillary vessel surrounded by its endothelial sheath, external to which the cells of the tumour—round, spindle, stellate, etc.—develop.

CHAPTER V

THE PATHOGENESIS OF MYOMA

THE pathogenesis of tumours is one of the most interesting medical problems now pressing for solution; and of this problem the pathogenesis of myomata is but a particular instance. It will be well, therefore, to refer briefly to the subject in general terms before discussing the particular case.

It is now evident that out of the confusion of a transitional period but two conceptions as to the origin of neoplasms have emerged—the one based on the cell theory, and the other on the germ theory; and henceforth the struggle must be between these two.

Briefly stated, the question now is: Do neoplasms arise, as Johannes Müller believed, through a modification of the formative process; or are they the outcome of the inflammatory process, as Broussais maintained, owing to the intrusion of microbes or other irritants *ab extra?* In other words, are they essentially of *intrinsic* or *extrinsic* origin? I incline to the former alternative. I believe that neoplasms arise mainly from the play of forces generated within the body, and in what follows I shall endeavour to show that this is the case with uterine myomata.

The outcome of recent researches as to the genesis of these tumours indicates that, in a large proportion of cases, their origin is intimately associated with developmental irregularities; and conditions of this kind are probably the chief morphological factors in their development.

Among the grosser uterine malformations with which myomata may be associated, special mention must be made of uterus duplex, instances of this having been reported by Galabin, Gow, Pick, Graverry, Falk, and others.

In an interesting case by Clay, double uterus and vagina was associated with uterine myomata and absence of one kidney.

In a uterus didelphys, Czerwenka found two myomata of the left corpus with cancer of the left cervix, and Jackson has seen myomata in an atresiac infantile uterus in which cancer was also present.

Pick has met with a case in which the uterine malformation seemed to be due to the presence of a fœtal myomatous nodule, interfering with the union of the lower segments of the Müllerian ducts, the disposition of the cervical plicæ favouring this view.

Instances have also been reported of the development of myomata in the rudimentary horn of uterus unicornis (Romiti, Routh, Doran, Mackenzie, etc.); while in a case described by Mundé similar tumours were present in the developed parous horn of a malformed uterus of this kind.

In a pseudhermaphrodite, aged fifty, in whom the female type appeared to predominate, Gruner found myomata of the malformed uterus; and in another person, aged forty-nine, with a similar defect, Howitz met with a tumour the size of a cocoanut, due to myomatous disease of the unicorn uterus. In the latter case the left tube was absent, the ovaries were represented merely by small nodules, remains of Gaertner's ducts were found in the vaginal walls, and there was hypospadias with hypertrophy of the clitoris.

Thomas has seen myomata with congenital anteflexion, and in a sterile woman with an infantile uterus Keiffer found a large myoma of the cervix.

Myomatous tumours have also been met with having in their interior diverticula from the uterine cavity, as in cases of uterus accessorius—bifid, trifid uterus, etc. (Recklinghausen, Ricker). Such conditions appear to be due to

abnormal myomatous growth, around persistent diverticula from the Müllerian ducts during embryonic life, of which Meyer and others have described instances.

Guyot has found uterine myomata associated with vaginal malformation; and Wetherill, in removing a large tumour of this kind, noticed supernumerary oviducts and hydatids. The concurrence of vaginal atresia and uterine myomata has been noted by Jenks.

Neumann has described myomata of the uterus and tube concurrent with Wolffian 'rests' in both ovaries; and Russell has reported the discovery of Müllerian relics in the ovary, whence structures like utricular glands had evolved, that exactly resembled the epithelial inclusions found in many uterine myomata.

This leads me to remark on the frequency with which uterine myomata are complicated with ovarian cystomata (often bilateral), dermoids, and cysts of the adnexa—broad ligaments, round ligaments, etc.

Of his operated uterine myomata, Péan found associated ovarian cystomata in 12·5 per cent.; and of Winckel's ovarian cystomata, 18 per cent. were concurrent with myoma uteri.

There is a typical specimen of myoma complicated by ovarian cystic disease in the Hunterian Museum (No. 4,634 of the Pathological series), which is thus described in the catalogue: 'A large myoma of the corpus uteri (8 inches by 6 inches), from a single woman, aged twenty-six, both of whose ovaries were removed for cystomata.'

In a remarkable case reported by Buffett, the combined weight of the associated tumours amounted to no less than 216 pounds, the left ovarian cystoma weighing 180 pounds, and the uterine myoma 36 pounds.

In the case of a negress with an enormous cystic myoma weighing 135 pounds, as described by Stockard, the uterus also contained several solid myomata; and besides there was a small myoma of the left Fallopian tube, a cyst of the corresponding broad ligament, and cystic disease of the left ovary.

Leo has found myomata of the uterus coexisting with cystoma of the right ovary and polycystic disease of the left kidney.

Thornton has met with multiple uterine myomata associated with a large multilocular cystoma of the right ovary, a cyst of the right broad ligament, and multiple cysts of the left ovary; and in Hodge's case uterine myomata were associated with cystic disease of the ovary and broad ligament.

Dartigues and Claisse have recently reported an instance in which a large uterine myoma coexisted with an enormous multilocular cyst of the left ovary and a dermoid of the right.

Emmet has seen a large cystic myoma of the fundus, with several solid myomata adjacent to it and a polypoid intra-uterine myoma, concomitant with multilocular cystoma and dermoid of the right ovary.

The frequency with which uterine myomata are multiple, might of itself lead us to suspect the association of developmental irregularity with the origin of these tumours; and the occurrence of cases in which the whole musculature is converted into a dense mass of small tumours—of which Emmet has described a remarkable example—points to the same conclusion.

Of like import is the finding of uterine myomata concomitant with similar tumours in the ovary, broad ligament, round ligament, tube, vagina, and in other situations adjacent to the uterus, of which many examples have been recorded.

Thus, Neill has met with a case in which myomata coexisted in the uterus, broad ligaments, and ovaries; and Virchow long ago reported an instance in which the uterus, ovaries, and vagina were concurrently affected.

I now pass to the consideration of the connection between myomata and certain less obvious developmental flaws to which Cohnheim has specially called attention. When Cohn-

heim first announced his theory of the origin of tumours from sequestrated fragments of the germinating tissues, very few facts could be adduced in support of it. No one then believed in the possibility of such an amount of developmental irregularity as it presupposed. The light of modern science has, however, effectually dissipated this misconception, and our eyes have been opened to the hidden defects of normality. Sequestrated fragments of the various tissues and organs have now been found to exist in every part of the body that has been specially examined for them. The uro-genital system is no exception to this rule, for the track of the Wolffian and Müllerian ducts is shown with débris of this kind.

Moreover, it will be readily understood that the coming together of the various ducts, from the fusion of which the uterus and vagina result, predisposes to the sequestration of portions of the matrix of adjacent structures, and their inclusion within the nascent organs.

Long before Cohnheim's time the tendency of tumours to originate at the seats of developmental defects had been recognised by Paget, Virchow, and others. Even as far back as 1853, referring to the proneness of melanomata to arise from pigmented moles, Paget said: 'It seems a striking illustration of the weakness in resisting disease which belongs to parts congenitally abnormal. . . . This peculiarity may make us suspect that there may be other, though invisible, defects of first formation in our organs, which may render them, or even small portions of them, peculiarly apt for the seats of malignant disease,' etc.

Recent observations show that most uterine myomata and cysts arise, in like manner, from dislocated myomatous elements connected with abnormally evolving 'rests' of Wolffian and Müllerian structures, or even of the uterine mucosa itself. Thus their initial multiplicity may be accounted for, as well as the similitude of their structure to that of the uterine wall.

The discovery of epithelial inclusions in uterine myomata was one of the earliest indications of the correctness of this

interpretation. The presence of these foreign elements in myomata was first demonstrated by Babès and Diesterweg in 1882, and their observations have since been confirmed and amplified by Schöttlander, Hauser, Ricker, Orloff, Recklinghausen, Meyer, Hirst, and others. They present either as solid cellular aggregations of various shapes and sizes, or as tubules, cysts, or structures not unlike utricular glands; in any case the peripheral cells are of more or less columnar or cubical type, and they may be ciliated (Fig. 16). Many observers (Meyer, Tourneux, Ricker, Fischel, Coblenz,

FIG. 16.—SECTION OF A SMALL MYOMA, SHOWING EPITHELIAL INCLUSIONS AND SMALL EPITHELIAL-LINED CYSTS. (Zeiss, Obj. A, Oc. 2.) (RICKER.)

etc.) have found similar epithelial inclusions—from which they believe certain cysts arise—in the otherwise normal uterine musculature.

By Babès and Recklinghausen these structures are believed to be Wolffian relics, while other pathologists insist on their Müllerian origin.

But all such bodies are not necessarily either Wolffian or Müllerian residua, for they may be included sequestra from the uterine mucosa itself. Indeed, Ribbert has found—deep in the uterine wall—not only sequestrated utricular

glands, but even isolated fragments of the entire mucosa.* In like manner the Nabothian follicles arise as sequestrations from the glands of the cervix.

Bearing in mind the developmental correlation between the uterine musculature and its numerous bloodvessels—which are so extraordinarily interwoven—it is easy to conceive how, by a similar process, these adeno-myomatous inclusions arise, owing to the migrations and changed relations of the parts incidental to ontogeny.

Such is the manner in which I believe the germs of myomata originate.

It seems probable that most anomalies of this kind are of embryonic origin; but there are good reasons for believing that similar conditions may also arise during post-embryonic life. In the normal uterus the deep extremities of the utricular glands often penetrate for some distance into the adjacent musculature, and in 'glandular endometritis' this interpenetration is still more marked; while during pregnancy —when interpenetration is very noticeable—conditions arise that tend to sever the connection of the glands with the free surface. In such ways fragments of the utricular glands are often sequestrated, and included in the musculature during post-embryonic life.

Are glandular elements thus derived ever included within myomata? Schöttlander, Ribbert, and others have observed appearances which point in this direction.

However this may be, it has been clearly established that the genesis of uterine myomata is connected with abnormal development of the musculature, detached fragments of which—grouped around heterotopic epithelial 'rests'—are the germs whence these tumours arise; and it is noteworthy that such formations are chiefly found in the immediate vicinity of the small arteries, which is just the place where myomata usually originate (Kleinwächter, Rösger, Keiffer, Pilliet, etc.).

Myomata are, however, not confined to the uterus, for

* According to Hirst, mucosal 'rests' are surrounded by a sheath of cytogenic tissue, by which they may be distinguished from Wolffian relics.

they may be met with in any part of the body where organic muscle cells are present; but they are incomparably more frequent in the uterus and its vicinity than in any other situation, except the prostate. Like their uterine congeners, these extra-uterine myomata are often multiple; and in the prostate, skin, and some other localities, they usually contain epithelial inclusions.

If the foregoing views as to the origin of myomata be correct, it follows that local irritation and chronic inflammation play but a secondary part in their causation. The altered condition of the endometrium that accompanies uterine myomata is, I think, a consequence rather than the cause of the disease.

The presence of various bacteria in these tumours has been demonstrated by Nelson, Gallipe, and Landouzy, and Vedeler claims to have seen protozoa in them; but nothing has transpired to justify the assumption that microbes have anything to do with their genesis. The origin of these tumours is, I believe, more closely associated with embryology than with bacteriology.

Wherever organic muscle is found, it is intimately associated with connective tissue. Consequently there has been much discussion as to whether myomatous or connective-tissue elements are chiefly concerned in their histogenesis. The observations of Busachi and others, show that unstriped muscle cells have greater aptitude for producing new elements by mitotic multiplication than is generally believed; and these young elements—in the form of minute nodules—are chiefly found in the immediate vicinity of the small bloodvessels. It is to this source that most of those who have studied these formations in their earliest stages ascribe the origin of the disease (Keiffer, Orloff, Rösger, etc.). It thus appears that Virchow was perfectly right in insisting upon the essentially myomatous nature of these tumours.

The remarkable proneness of uterine myomata to fibrification and calcification probably depends upon the inclusion of fibrinogenous and sclerogenous elements from adjacent parts during early embryonic life.

The occasional presence in these tumours of cartilaginous and even truly osseous structures (Henle, Bidder, Freund, etc.) especially points to this conclusion.

In like manner, the sarcomatous and cancerous changes that occasionally supervene in myomata no doubt originate from parablastic and archiblastic sequestrations, included in them *ab initio*.

CHAPTER VI

THE MORPHOLOGY OF MYOMA

Introductory.

THE names given to tumours by their earliest investigators are of interest, as indications of the views then held as to their nature.

Those who first studied uterine myomata were struck with their resemblance to fibrous tumours, hence by Bayle and

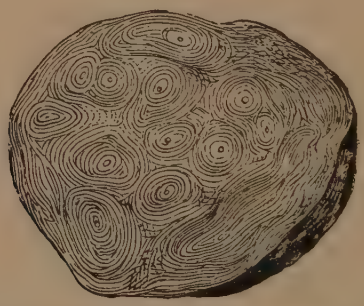

FIG. 17.—A SMALL MYOMA IN SECTION. Natural size. (BILLROTH.)

Cruveilhier they were named 'corps fibreux,' and by Rokitansky 'fibroid.' Broca, being desirous of signalising the resemblance of their structure to that of the uterine wall, gave them the name of 'hystérômes'; while Virchow, having satisfied himself that they contained muscle cells—as Vogel had previously indicated—insisted on the propriety of calling them 'myomata.'

Such tumours present as rounded, ovoid, or tuberous masses of firm consistency, and they are usually circumscribed

and encapsuled (Fig. 17). When small, as they lie in the midst of the uterine wall, they resemble knots in a piece of wood. On section they usually project, the cut surface presenting a dense fibroid, or in some cases cartilaginiform, aspect of whitish, grayish, or pale-pinkish colour; and an uneven, ridged, laminated appearance is often noticeable, owing to the transversely divided muscle bundles contracting more than those longitudinally severed.

FIG. 18.—SECTION OF A MYOMA, SHOWING THE FASCICULATED ARRANGEMENT OF ITS CONSTITUENT BUNDLES. (GUSSEROW.)

General Anatomy.

On close examination a peculiar concentric disposition of the myo-fibres can be made out, as if these were whorled round many distinct axes; and the interwoven systems can be seen cut in diverse planes (Figs. 17 and 18). This is the result of the perivascular mode of growth.

Exceptionally myomata are of soft consistency; this especially applies to œdematous, inflamed, telangiectasic, and myxomatous varieties. These soft tumours are often remarkably malleable, and most myomata become more or less plastic during pregnancy.

The relation of myomata to the surrounding musculature, in the midst of which they develop, has been much discussed.

When of some size they are more or less completely isolated from the adjacent parts, by a layer of loose vascular connective tissue, which surrounds them; hence they can be easily enucleated, although they have no distinct lining membrane. Yet it seldom happens that they are completely isolated, for at various points of their surface fibro-vascular bands unite them with the surrounding parts. In some cases these uniting bands are so numerous as to hold the tumour firmly in its place, and this is specially the case with cervical tumours. Even when so small as to be only just visible to the naked eye, myomata are distinctly discontinuous and encapsuled, although even at this early period fibro-vascular bands unite them with the surrounding musculature.

Hard tumours are more readily detachable than soft ones, their vascular connections being slighter.

Some myomatous tumours comprise several distinct neoplasms within a common capsule; these conglomerates generally present as irregularly-shaped, nodular, or lobulated masses.

Stone has described a large multinodular tumour of this kind, weighing 4 pounds, which consisted of 'myriads of small growths of various shapes.'

Diffuse Myoma.

Tumour-like thickenings affecting the whole or only part of the musculature are occasionally met with, in which no line of demarcation circumscribes the morbid formation. Cases of this sort have been described by Braithwaite, Cullingworth, and others, as examples of 'diffuse myoma.'

It appears to me that the term 'myoma' cannot properly be applied to such swellings, which are probably the outcome of hypertrophy, inflammation, syphilis, etc.; but some local overgrowths of this kind may be due to abnormal growth around unobliterated relics of the Müllerian ducts, etc., as mentioned in the preceding chapter.

I expect that the disease described by the Baltimore

surgeons as 'adeno-myoma uteri diffusum benignum' is an inflammatory pseudoplasm. It is noteworthy that one or more true myomata generally co-exist with these lesions.

Histology.

On microscopical examination of sections of myomata —stained with logwood and mounted in the usual way—one sees with a low magnification numerous broad bundles of wavy fibrous tissue running in various directions, in the midst of which are quasi-granular areas, due to other fibrous bundles viewed in cross-section.

On examining the longitudinally disposed bundles closely,

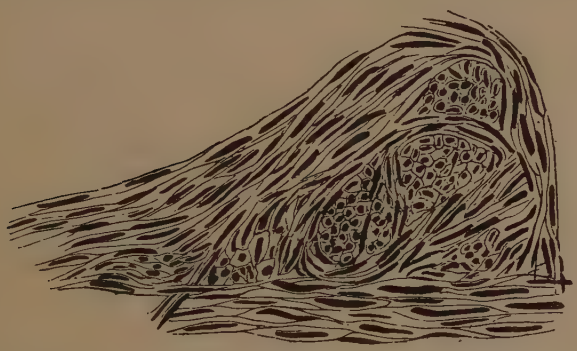

FIG. 19.—SECTION THROUGH A MYOMATOUS NODULE, SHOWING ITS HISTOLOGICAL STRUCTURE. (PERLS.)

The nuclei are seen in longitudinal and cross section.

numerous highly-stained, elongated nuclei can be seen (Fig. 19).

In order to demonstrate the presence of muscle cells in these fibrous bundles, it is advisable to steep the sections in a 20 per cent. solution of nitric acid; this dissolves the fibrillæ, when the muscle cells can easily be distinguished, and they may be isolated by teasing.

The nuclei are best shown by treating sections with dilute acetic, instead of nitric, acid. With a high power the elongated fusiform muscle cells can now easily be recognised, each with its rod-shaped nucleus. These cells resemble

their congeners of the normal uterine wall, but they are generally larger than those of the non-gravid organ, yet not so large as those of the puerperal musculature. They are also larger than the somewhat similarly shaped cells frequently met with in fibrous and sarcomatous structures.

Thus examined, the above-mentioned quasi-granular areas are seen to consist of small rounded or polygonal bodies, most of which contain nuclear substance; they are muscle cells in cross-section. Such bodies may easily be mistaken for groups of small round cells (Fig. 19).

It will be gathered from what has been stated, that these tumours consist of numerous inextricably interwoven fibro-muscular bundles. Their connective-tissue constituents are fairly well provided with cellular elements, which are usually discrete; but here and there islets of quasi-embryonic cells may be met with. Elastic fibres are also present. In many specimens epithelial structures, such as those I have previously described, can plainly be seen with a high power.

In all but the smallest tumours fibrous tissue abounds; hence, after boiling, gelatine is the chief product obtained. Nevertheless, it is doubtful whether pure fibromata of the uterine musculature really exist; if so, their entity has yet to be demonstrated.

As a rule, the older the tumour, the harder and more fibrous it is; on the other hand, small tumours, and large ones of the soft kind, generally consist chiefly of myomatous tissue. It is these soft muscular tumours that manifest contractile properties during life; and they are often very vascular, varying much in size from time to time, of which Dalché, Hicks, and others have described examples. These variations in the structure of myomata are not without their counterparts in the various phases of the physiological evolution of the uterine musculature.

Vascularisation, etc.

Myomata also comprise bloodvessels, lymphatics, and nerves, but they are not so well supplied in these respects as the uterine parenchyma; hence their comparatively low

vitality, which accounts for the readiness with which they inflame, suppurate, and slough when injured. The blood-vessels consist of arteries, capillaries, and veins, whose walls may be intimately blended with the surrounding tumour substance.

Even when small, myomata are but poorly vascularised, and as they increase in size vascularisation is seldom proportionately augmented. Their blood-supply is not derived from a single vessel, but from numerous small offsets springing from the wreath of anastomosing vessels which surrounds each of them, branches penetrating into the tumour through the connective-tissue septa; hence the periphery of such tumours is much better supplied with blood than the centre, which is usually almost avascular. The capillaries are ill-formed, consisting of endothelial-lined channels and ampullary spaces in the myomatous matrix. This is probably one of the reasons why the tumours bleed so freely when slightly wounded or abraded. In the fibrous septa between the various lobules of the tumour I have often noticed large thick-walled arteries; and the veins in this situation and in the capsule are also sometimes largely developed. Such conditions may be a source of serious hæmorrhage during operative procedures.

By Klebs and others the lymphatics of myomata are described as consisting of endothelial-lined channels and spaces, between the constituent muscle bundles.

Although but slightly sensitive, myomata contain nerves (Astruc, Bidder, etc.), which Hertz claims to have traced to the nuclei of the muscle cells.

Single or Multiple?

Myomata are generally said to be seldom solitary, but of 100 laparotomies for this disease by Engeström—in all of which the uterus was carefully examined—in sixty-three cases only a single tumour was detected, multiple tumours being present in the other thirty-seven cases. Pollock long ago reported that, of thirty-nine myomatous uteri examined by him, twenty-one contained only a solitary tumour; and

Fordyce Barker has stated that single and multiple tumours are of about equal frequency. If solitary tumours really are as frequent as this, it would be a reason, among others—in the event of surgical treatment being necessary—for preferring myomectomy to more radical operative procedures. It is strange that modern pathologists have done nothing to elucidate this question.

According to Martin, the older the patient the greater is the tendency to multiplicity. Sometimes the whole uterus

FIG. 20.—MULTIPLE MYOMATA INVOLVING THE WHOLE UTERUS. (EMMET.)

The white areas represent calcified tumours.

is riddled with myomata, which may be counted by dozens, scores, or even by hundreds. These multiple tumours are usually of different sizes and degrees of development, some being no bigger than a pin's head, while others are very large.

The following is an account of the most remarkable example of this form of the disease with which I am acquainted.

The patient was under the care of the celebrated American gynæcologist Emmet. When first seen by him she was in a very weak and emaciated condition. There was great abdominal distension from the tumour, and she suffered much from pressure symptoms. Strange to say, there was

FIG. 21.—A MYOMATOUS UTERUS, SHOWING MULTIPLE TUMOURS, REMOVED BY VAGINAL HYSTERECTOMY WITH MORCELLATION. (PÉAN.)

no metrorrhagia. She died of exhaustion soon after Emmet first saw her.

At the necropsy the tumour was found to consist of the greatly enlarged uterus, converted into a conglomerate of

hundreds of myomatous nodules—none of great size—held together by a thin overlying capsule, through which their inequalities could be seen and felt. On section the mass presented the appearance shown in Fig. 20. The section was made with difficulty, as many of the tumours were of a dense fibrous nature, and others were calcified. Hardly any normal uterine tissue was left. The bloodvessels of the part had been so obliterated by the pressure of the tumours, that only the peripheral nodules presented any signs of vascularity. Emmet subsequently met with a second similar case.

Instead of involving the whole organ, multiple myomata are sometimes limited to a special part. In the Hunterian Museum is a uterus (No. 4,627 Pathological Series) with numerous tumours of this kind, occupying nearly every part of its walls, except the cervix, which is free. Rabenau has met with similar tumours limited to the cervix.

In Fig. 21 a good example of multiple myomata is displayed, most of the tumours having been removed by morcellation from the inferior uterine segment, during the course of vaginal hysterectomy.

Very Large Tumours.

In 1872 Spencer Wells wrote with regard to large myomatous tumours: 'It is only since ovariotomy has become a familiar operation that the fact of uterine tumours frequently attaining a very large size has become generally known. Even now I am often told by men of great experience that a tumour must be ovarian, because it is too large to be uterine. They have never seen nor heard of any such enlargement of the uterus, and are astonished when I say that the largest abdominal tumours I have ever seen have been fibroid or fibro-cystic tumours of the uterus.'

Even now misconceptions of this kind are not altogether extinct. Hence it is necessary for me to point out that myomatous tumours may attain immense size; indeed, such gigantic formations as those I am about to refer to are among the largest tumours to which humanity is prone.

The subjoined figure (Fig. 22), from a photograph, represents a patient with the largest tumour of its kind known to me. It is a cystic myoma, removed by Severanu of Bucharest, which weighed 195 pounds. The cystic part contained

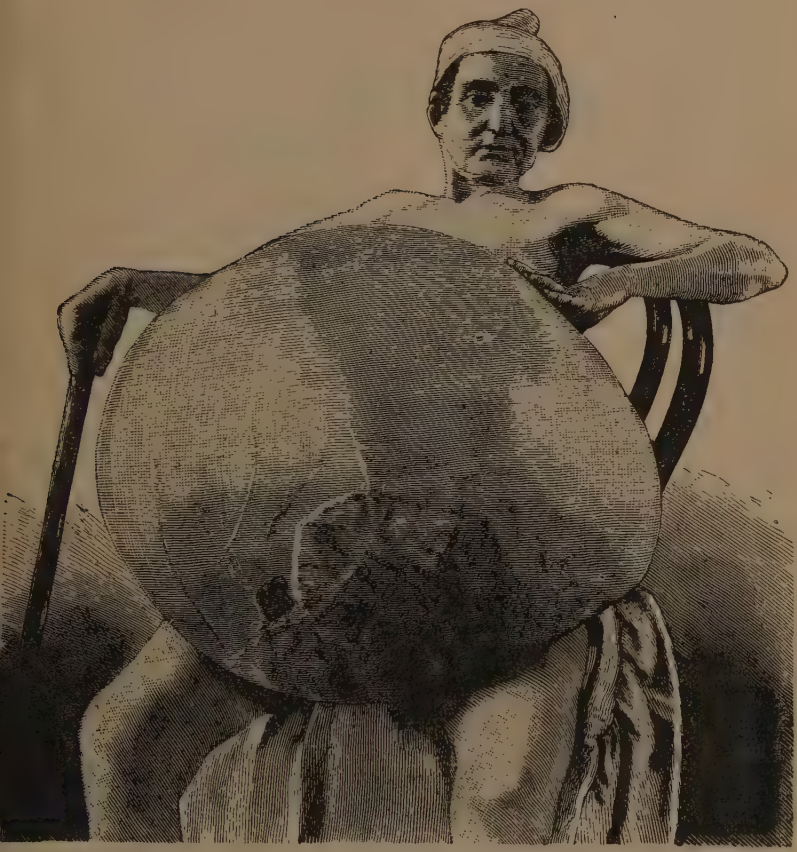

FIG. 22.—ENORMOUS CYSTIC MYOMA. (SEVERANU.)

17½ pounds of coffee-ground sediment. The abdominal distension was enormous, measuring 6 feet at the level of the umbilicus. The distended abdominal wall was marbled by numerous very large and prominent veins, while the skin over its lower part was œdematous and eroded.

Several instances of myomatous tumours weighing over 100 pounds have been recorded, of which the following are the chief examples:

In Hunter's case the patient was a single woman, aged fifty-three years, who had a huge cystic myoma weighing

FIG. 23.—VERY LARGE CYSTIC MYOMA IN A NEGRESS. (STOCKARD.)

140 pounds. The abdominal girth was 6 feet 2 inches. The patient without the tumour weighed only 95 pounds. She was conscious of having had abdominal enlargement for upwards of twenty years. The tumour had of late incon-

venienced her by reason of its great size, but she had never suffered from hæmorrhages. She died from exhaustion after repeated attacks of an intermittent type of fever, and the tumour was removed post-mortem. Its great length was 4 feet 7 inches.

Stockard's patient, a multiparous negress, aged fifty-five years, had a cystic myoma of 135 pounds in weight, which contained nearly 9 gallons of chocolate-coloured fluid (Fig. 23). The measurement round the abdomen was 5 feet 8 inches. This poor woman enjoyed good health until she had attained the age of forty-three years, when she first noticed a tumour in the right iliac region. Four years later she was tapped, and several gallons of fluid were withdrawn. In about a year's time the abdominal swelling was larger than ever; and when Stockard first saw her, a few years later, she had an enormous pendent abdominal tumour which reached below the knees, and was so heavy that she could neither walk nor work. The skin over its lower part was rough and eroded. She was again tapped, an immense quantity of fluid being removed; but she died from exhaustion on the sixth day after the operation. The solid part of the tumour weighed about 30 pounds. It was attached by a pedicle an inch in diameter to the posterior part of the fundus uteri, which also contained an interstitial myoma. A mucosal polypus projected within this part of the organ. Besides these lesions there were a small myoma of the left tube, a small cyst of the corresponding broad ligament, and the left ovary was converted into a cystic tumour.

The largest solid tumour known to me is a uterine myoma —removed by McIntyre—which weighed 106 pounds. The person who bore this colossal growth was a coarse, masculine-featured woman of medium height, aged thirty-eight years. The circumference of the abdomen at its largest part was 50 inches. The great weight and bulk of the tumour made walking very difficult. The patient first noticed commencing abdominal enlargement when she was thirty-two years old. Paracentesis had been performed on several occasions, but only blood had come away. In the course of laparotomy

for removal of the tumour, it was noticed that hæmorrhage from the abdominal wall was very free—enormously distended bloodvessels requiring the application of numerous pressure forceps. The tumour was everywhere extensively adherent. A thick, heavy pedicle was with difficulty isolated, transfixed, and ligatured; and the tumour was then cut away. The patient unfortunately succumbed to septicæmia on the fifth day after the operation.

Platonoff has met with a solid interstitial myoma that weighed over 90 pounds. The person affected was a Cossack's wife, aged forty-five, and the symptoms were of ten years' duration. Laparotomy was performed, but the tumour could not be removed on account of extensive firm adhesions with all the contiguous structures. The great size of the tumour precluded closure of the severed abdominal wall. Subsequently attempts were made to remove it piecemeal, with the aid of Paquelin's cautery; but these had to be abandoned on account of the free hæmorrhage produced. Gangrene soon afterwards supervened, and caused the patient's death. At the necropsy the tumour was found to be a very large vascular myoma.

Several examples of solid myomata, weighing from 40 pounds to 70 pounds have been reported; and there are some good specimens of this kind in the Hunterian Museum.

Such immense tumours are very rare; but growths the size of a man's two fists are often met with. Those who bear these large tumours generally present an emaciated, feeble, and cachectic aspect; and they are unduly prone to various cardiac affections, which are often aggravated by respiratory difficulties resulting from the great size of the tumour. Large myomata are nearly always complicated by extensive adhesions with adjacent structures—the great omentum, cæcum, appendix, bladder, mesentery, ovaries, parietal peritoneum, etc. The risk of removing such large tumours is, of course, exceptionally great.

Locality affected.

Although myomata are not exclusively limited to the corpus, yet this part of the uterus is very much more frequently affected than the cervix. In fact, over 90 per cent. of all uterine myomata arise from the corpus; whereas but very few originate from the cervix, and still fewer from the portio. Thus, these tumours are most prone to form in just that part of the musculature where post-embryonic developmental changes are most active, and where muscle elements most abound. Tait says: 'I have never seen a growth of this kind spring from the cervix.' Considering his large experience, this is a surprising statement; and shows that he has not observed the matter very closely.

Of 131 uterine myomata, Courty found that 110 (84 per cent.) arose from the corpus, and 21 (16 per cent.) from the lower part of the organ. According to Schroeder, 8·1 per cent. of all cases are cervical; while Lee estimates the proportion of myomata that are cervical at 5·4 per cent.

The fundus and the posterior wall of the corpus are more prone to be affected than its anterior and lateral parts. Thus, of Emmet's 157 cases 53·5 per cent. were connected with the posterior wall, and 29·9 with the anterior wall; while of Lee's 74 cases 19 arose from the fundus, 18 from the posterior wall, 4 from the anterior wall, and in 5 cases all parts of the organ were invaded.

The uterine musculature comprises three distinct parts: that beneath the peritoneal investment (myoperitoneum), which is continuous with the muscular layer lining the broad ligaments, etc.; that connected with the deep part of the mucosa (myometrium); and that much thicker intermediate part, which is so inextricably interwoven around its numerous contained bloodvessels. This last part is by far the most important physiologically, morphologically, and pathologically; and it comprises the bulk of the musculature.

Myomata may arise from either of these layers; but most of them originate in the thick intermediate part, whatever position they may subsequently acquire.

As the nascent tumour increases in size, it often tends to project, either beneath the peritoneum into the abdominal cavity, or beneath the mucosa into the uterine cavity, so that distinctly polypoid tumours result. This accounts for the fact that most tumours of this kind are at first covered by a thin, extracapsular layer of muscle tissue, which has often led to their being mistaken for mere excrescences of the musculature. In other cases, as the tumours increase they remain embedded in the musculature. Of Winckel's numerous cases, 25 per cent. of the tumours were mainly subperitoneal, 65 per cent. intramural, and 10 per cent. were submucous.

The Subperitoneal Myoma.

In the subperitoneal form, as the tumour increases in size, it gradually carries with it the overlying serosa and most of the intervening muscle tissue atrophies; so that at length the neoplasm becomes quite detached from the musculature, being connected with the uterus only by a short pedicle, which consists of connective tissue, muscle elements, bloodvessels, and lymphatics, covered by the displaced serosa. Such pedicles vary much as to their vascularity and as to the amount of muscular tissue they contain.

In many instances the bloodvessels atrophy, when the tumours acquire a very dense fibrous structure. Large, rapidly growing tumours are generally of elastic consistency, and they may even be quite soft. As the pedicle elongates, subperitoneal myomata gradually take on the clinical aspect of extra-uterine tumours; hence they more frequently cause pelvic peritonitis, adhesions, and fluid in the peritoneum than other varieties of myoma. Large tumours of this kind, like ovarian tumours, which they often simulate, sometimes cause prolapse of the uterus.

Their favourite seat of origin is the fundus or its vicinity, and they are frequently of conglomerate structure; hence pediculated tumours of this kind may be found growing superimposed upon one another.

Subperitoneal myomata are generally of moderate dimensions, but exceptionally they attain great size.

This was the case with the specimen figured below (Fig. 24), which was removed by laparotomy from a single woman, aged thirty-six. The tumour was of five years' duration; for the last six months it had increased rapidly; and she had become weak and emaciated. When seen shortly before the operation, she had a very large abdominal tumour which felt elastic, and was taken to be an ovarian cystoma. The patient died on the third day after its removal from 'fibrinous deposit

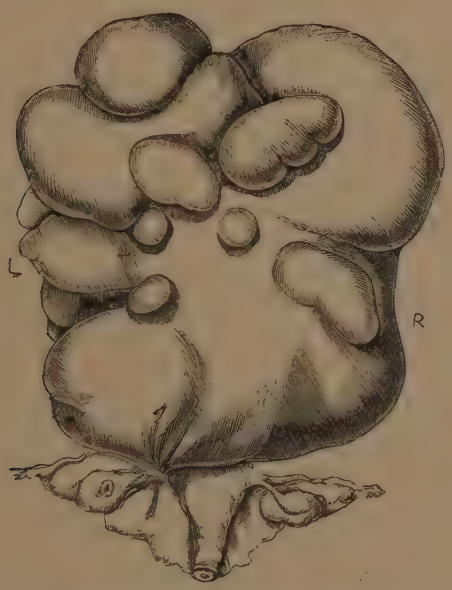

FIG. 24.—A LARGE ŒDEMATOUS SUBPERITONEAL MYOMA CONNECTED BY A SHORT PEDICLE WITH THE POSTERIOR SURFACE OF THE FUNDUS UTERI ON ITS LEFT SIDE. (SPENCER WELLS.)

A ruptured Graaffian follicle is seen in the left ovary. The specimen is viewed from behind.

on the right side of the heart.' The tumour was of nearly globular form, 17 inches in diameter; and it weighed 34 pounds 10 ounces. There were five principal lobes on its posterior aspect, and several smaller ones, many of them being partially pedunculated. The mass was of elastic consistence, but contained no cysts. A serous fluid exuded from its cut surface. Histologically it appeared to consist chiefly of loosely arranged œdematous fibrous tissue.

Subperitoneal tumours are very prone to œdematous, inflammatory, calcareous, and cystic changes. Usually they have a short and thick pedicle, but sometimes this undergoes great elongation and attenuation. This condition favours prolapse of the tumour into Douglas's pouch, etc., where it may become fixed by adhesions, or it may cause acute peritonitis.

Torsion of the Pedicle.

Elongation of the pedicle also allows these tumours to pass upwards out of the pelvis into the abdomen; where they may be mistaken for ovarian, hepatic, or other intra-abdominal tumours. In such cases the uterus is apt to be dragged upwards, both it and the vagina undergoing elongation, and the portio tends to be effaced, while the bladder also is often much displaced. This elongation of the pedicle, etc., predisposes it to torsion, which may lead to acute inflammation and gangrene of the tumour; or, when the obstruction to its circulation is incomplete, subacute inflammatory reaction may ensue, leading to the formation of extensive adhesions with adjacent structures, especially the great omentum, by which the nutrition of the tumour is maintained. Uterine myomata are, however, less prone to these accidents than ovarian cystomata.

Sequestrated Myomata.

Attenuation of the pedicle is sometimes so extreme as to lead to its spontaneous rupture. Croom reports a case in which, on opening the abdomen, he found a tumour the size of a large orange in Douglas's pouch; whose pedicle was so thin that, on attempting to ligature it, the tumour came away in his assistant's hands. In this case the pedicle consisted of little else than the peritoneal sheath. This explains how it is that such tumours may be found free in the peritoneal cavity, of which instances have been reported by Baldy, Turner, Eve, Depaul, Wylie, Rindfleisch, and others. Such bodies are usually of no great size; but in Rindfleisch's case a completely detached myoma, as big as the fœtal head at term, was found in the right iliac fossa, whence it was suc-

cessfully removed by laparotomy. Sequestrated tumours of this kind are usually more or less calcified, and they are apt to cause hydroperitoneum.

The Hunterian Museum contains a good specimen of two detached tumours, which were situated between the rectum and the uterus, having been sequestrated from the posterior wall of the latter (No. 4,638, Pathological series). One was located just above the other, and both were of spheroidal shape, the lower one being 4 inches in diameter, and the upper one somewhat smaller. Their contiguous surfaces were slightly adherent. Both tumours were very dense and solid. The specimen was obtained from the body of a woman, aged ninety-one, who had manifested symptoms of the disease for thirty-seven years.

In the process of separation, tumours of this kind often contract adhesions with contiguous structures; where they remain engrafted, when their separation from the uterus is completed. The usual points of attachment are the great omentum, Douglas's pouch, the pelvic margin, the intestines, etc. Myomata thus circumstanced are very prone to inflammation—which may go on to gangrene—leading to acute peritonitis, perforation of the bladder, rectum, abdominal wall, etc.

Instances of this kind have been reported by Homans, Wallace, Routh, Nélaton, and others.

In Routh's case, a calcified myoma the size of a turkey's egg, detached from the uterus and grafted on to the small intestines, was successfully removed by laparotomy, the patient being fifty years of age.

In Wallace's case, the tumour was grafted on to the tissues at the pelvic brim; whence it was successfully removed, the age of the patient being thirty-eight years. The tumour was calcified *en coque*.

In the Hunterian Museum (No. 388, Pathological series) is a large, calcified, kidney-shaped myoma ($7 \times 3\frac{1}{2}$ inches), sequestrated from the uterus and grafted on to the adjacent abdominal structures. The specimen was taken from the abdomen of an old woman.

Care must be taken not to confound separated uterine tumours, such as the foregoing, with autochthonous myomata of the adnexa, etc. Uterine myomata are less prone to contract adhesions than ovarian cystomata.

Torsion of the Uterus, etc.

It occasionally happens that staked subperitoneal myomata of abdominal evolution exert such traction on the uterus and vagina, that these parts become elongated and attenuated to an extraordinary degree. Under these circumstances the uterus itself is liable to undergo torsion of an acute or chronic kind, which may lead to occlusion of the utero-vaginal canal, or even to its complete severance. In the former case retained products of secretion, menstrual fluid, etc., accumulate in the occluded uterine cavity, giving rise to the condition known as 'cystic uterus,' of which examples have been recorded by Tillaux, Meredith, Dubreuil, etc.

Torsion of the myomatous uterus may exceptionally occur without any marked elongation of the uterus, and even with sessile tumours. Ehrendorfer has reported a case of this kind. On opening the abdomen of a woman of thirty-six, who had suffered for some months with inability to micturate, a sessile subperitoneal myoma, as large as a man's head, was found impacted in the pelvis; and on its left side was the uterus completely twisted round on its long axis. The tumour was everywhere adherent to the adjacent parts, and its removal was difficult. Extraperitoneal treatment of the stump was adopted, and the patient made a good recovery.

Incarceration.

Subperitoneal tumours arising from the lateral and lower parts of the uterus, instead of rising up freely into the abdomen, may become incarcerated in the pelvis; where, pursuing their development between the layers of the broad ligament, they may seriously interfere with the functions of the bladder, rectum, etc. The whole tumour or only one or

more of its lobes may be affected. Under such circumstances anything that favours sudden increase in the size of the tumour may determine urgent symptoms, such as retention of urine, intestinal obstruction, etc. The usual factors are menstrual congestion, pregnancy, œdema, inflammation consequent on injury, etc. Retroversion of the myomatous uterus is also apt to be followed by impaction. The pregnant myomatous uterus is especially prone to accidents of this kind.

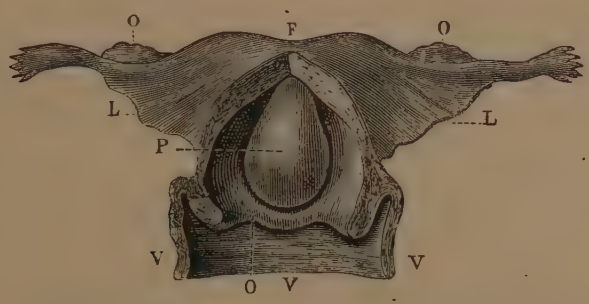

FIG. 25.—UTERUS WITH ITS ANTERIOR WALL LAID OPEN, SHOWING A POLYPOID INTRA-UTERINE MYOMA. (CRUVEILHIER.)

F, The fundus uteri; O, O, the ovaries; L, L, the broad ligaments; O, the cervix uteri; V, V, V, the vagina; P, a polypoid submucous myoma.

Submucous Myomata.

Submucous myomata tend to project into the uterine cavity, just as their subperitoneal congeners do into the peritoneal (Figs. 25, 26, and 27). Their favourite seat of attachment is the fundus or its vicinity. Such tumours are usually sessile, or they have only a short, thick neck. Even when this becomes elongated it remains thick; and it is usually well supplied with bloodvessels, including one or more fairly large arterial branches. It is important to note that at the point of implantation the uterine wall is nearly always thinned, and it is often more or less inverted.

This form of the disease generally gives rise to severe symptoms, so that it is clinically important, although such tumours seldom attain large size. Exceptionally, however,

very large formations of this kind are met with (Fig. 27); and Hunt has lately reported an example in which the tumour weighed 34 pounds, and was as large as the fœtus at term.

Submucous myomata generally present as smooth pyriform, ovoid, or rounded tumours—the pyriform shape being the commonest—with the attachment by the narrow end (Figs. 25 and 26). They are softer, more muscular, and more vascular than their subperitoneal congeners; but less prone to fibrous, calcareous and cystic changes, while conglomerate forms are most exceptional. It is rare to find

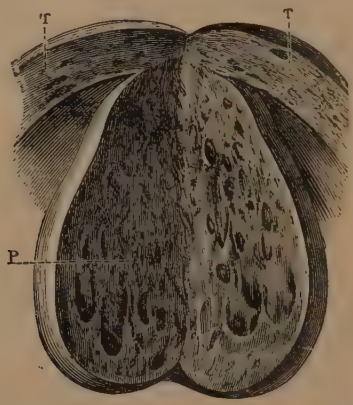

FIG. 26.—A POLYPOID INTRA-UTERINE MYOMA IN LONGITUDINAL SECTION, SHOWING ITS ATTACHMENT TO THE UTERINE FUNDUS. (CRUVEILHIER.)

T, T, The uterine wall; P, the polypoid myoma.

more than a single polypoid myoma within the uterine cavity, although with such a tumour intramural and subserous myomata may be associated; hence success usually attends their removal. But sometimes a fresh tumour forms after a time, owing to the enlargement and extrusion of some small previously existing nodule, of which instances have been reported by Fox, Post, etc.

Extrusion.

The presence of a myoma within the uterine cavity acts like a foreign body; the uterus contracts and endeavours to

expel it, becoming hypertrophied in the process ('grossesse fibreuse' of Guyon). Intermittent, expulsive, labour-like pains result from this condition. The tumour is thus gradually forced downwards towards the cervical canal, which it dilates; and it may even enter the vagina and be extruded from the vulva (Fig. 28).

About 8 per cent. of myomatous patients, seeking surgical advice, present this condition.

It has been noted that the mucosa lining that part of these extruding intra-uterine myomata, which projects into the

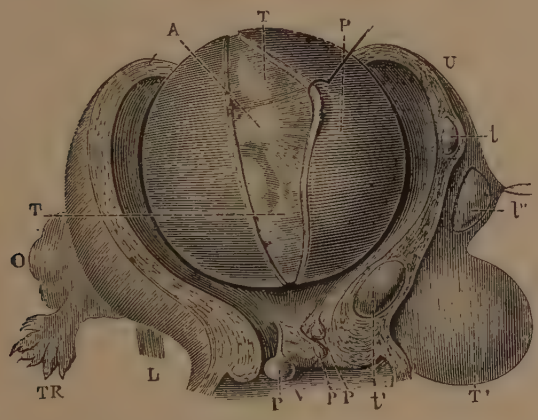

FIG. 27.—SPECIMEN SHOWING A LARGE SUBMUCOUS INTRA-UTERINE MYOMA, WITH MULTIPLE TUMOURS IN OTHER PARTS OF THE UTERUS. (CRUVEILHIER.)

U, The uterine wall laid open in front; T, T, large myoma filling the uterine cavity; P, capsule of myoma laid open; A, subcapsular connective tissue; T′, a subperitoneal tumour; t, t′, intramural tumours; t″, an intramural tumour becoming subperitoneal; P, P, P, mucosal polypi of the cervix; O, ovary; TR, Fallopian tube; L, round ligament; V, vagina.

vagina, often undergoes a remarkable metamorphosis. Instead of a single layer of ciliated columnar epithelium, we find multilaminar epidermoidal cells. This is usually cited as an example of the transformation of one variety of epithelium into another; but it seems to me more probable that it is due to grafting of vaginal epithelium on to the uterine mucosa lining the tumour by contact implantation, just as

happens in 'skin' grafting, etc. It accords with this that beneath the laminated epidermoidal cells, we find a single layer of columnar cells set perpendicularly on the basement membrane; while the glands and follicles still retain their one layer of columnar ciliated cells, as is well shown in a case investigated by Gervis, of which a good drawing is given.

During the catamenial periods, when the cervical canal temporarily dilates, intra-uterine myomata may project through the os, being retracted into the uterine cavity when the period has passed off; hence in doubtful cases it may be necessary, for the detection of such tumours, to examine *per vaginam* during the menstrual period.

Myomata that have become engaged in the cervix, often present a well-marked groove, where constricted by the os; indeed, such tumours may manifest remarkable plasticity.

Among the conditions favouring extrusion are congestion, œdema, septic infection, and other inflammatory complications, causing sudden increase in the size of the tumour, and many cases occur after parturition. In all these instances the determining factor generally is some injury sustained during examination with the sound, finger-nail, tent, curette, etc. Lediard has reported a case in which the slight wounding of an intra-uterine myoma with the sound, was soon followed by fatal septicæmia; and this is by no means an exceptional occurrence.

Here it may be mentioned that myomata extruding post-partum have several times been mistaken for retained placenta, of which Herman has reported an instance.

Severe hæmorrhages often add to the gravity of the situation caused by extruding tumours.

Should the pedicle of an extruding myoma rupture, as occasionally happens, the tumour may be found free in the cervical canal, or in the vagina, or it may even be expelled externally. This separation—which is usually the result of inflammation with sloughing, etc.—is then often attended with dangerous complications. In such cases there is

great risk of septicæmia, peritonitis, vesico-vaginal fistula, etc. In the Hunterian Museum (No. 4,619, Pathological series) is a large polypoid myoma (8 by 5 inches), which separated by sloughing from its attachment to the left side of the cervix. The patient died soon afterwards of peritonitis. It would be easy to multiply instances of this kind. In fact, the natural efforts at elimination usually end fatally in this class of cases.

The sequestration of submucous myomata by atrophy and attenuation of the pedicle, without inflammation, etc., is a highly exceptional occurrence.

Leyden has, however, published an account of a case in which there was a large detached myoma, impacted in the cervical canal, to the mucosa of which it was bound by numerous small adhesions. The patient was a virgin, aged forty-four, who had been subject to metrorrhagia for several years. Henschel has met with a similar case; and Crimail found a large myoma free in the uterine cavity. Ygonin has described a tumour 7 inches long and 15 inches in circumference, which was spontaneously expelled *per vaginam*. Similar instances have been met with during labour.

The so-called 'womb stones' are generally calcified submucous myomata that have become detached in the utero-vaginal canal; but of these more anon.

Inversion of the Myomatous Uterus.

Of the various complications of myomata demanding surgical intervention, inversion is one of the most urgent. It cannot be said that this condition has hitherto been studied with the attention that the important issues involved demand; and even in the best gynæcological treatises the subject is dealt with in a meagre and unsatisfactory manner, hence the condition is seldom recognised when seen. The forms of myomata prone to be complicated by inversion are submucous and intramural tumours, evolving towards the uterine cavity; and especially such of them as are in process of extrusion, of which many instances have lately been re-

ported. I have previously described the favourite situation, the mode of attachment, and the general features of these tumours; and if I again refer to the matter here it is because of the importance of bearing these considerations in mind, when called upon to deal with such cases.

Myomata causing inversion are nearly always attached to the fundus or its vicinity; but in the Glasgow Hunterian Museum is a specimen (No. 45, Diseases of the Female Sex Organs) showing inversion due to an extruding myoma the size of an orange, which is attached to the posterior uterine wall, just above the os internum.

Among the complications of this condition, I must call attention to salpingitis, hydro- and pyo-salpinx, which are more frequently associated with inversion and septically infected tumours, than with other forms of myomatous disease.

Inversion may be partial or complete, all intermediate degrees being met with. It is, however, rare to find complete prolapse of the inverted organ, as in a case reported by Gottschalk.

Its onset may be of gradual or sudden production, most cases belonging to the latter category; when the tumours are generally inflamed, sloughy, or gangrenous. Such cases are sometimes attended by alarming hæmorrhage, as in a case reported by Lawrence. The condition may easily be mistaken for an extruding myoma, the inversion being altogether overlooked. This is the more likely to happen since the union between tumour and uterus is, in these cases, generally very close (Fig. 28). Mistakes of this kind can be obviated by digital examination *per rectum*, when a hollow will be felt in the place of the dislocated organ; and a sound in the bladder readily comes in contact with the finger in the rectum.

In this connection it is well to bear in mind that inversion may occur long after the climacteric; indeed, a considerable proportion of the patients are of comparatively advanced ages.

In the mechanism of inversion two factors seem to me to be chiefly concerned: (i.) thinning and weakening of the

uterine wall at the seat of the tumour's implantation owing to pressure atrophy, which is the more marked the larger the tumour, and *vice versâ;* (ii.) contractions of the uterine musculature, excited by prolapse of the tumour into the cavity

FIG. 28.—MYOMA OF THE UTERUS WITH INVERSION: REMOVAL OF THE TUMOUR WITH THE INVERTED UTERUS PER VAGINAM. (PÉAN.)

of the organ, which is the chief cause of inversion with small tumours. The efficacy of these factors in any given case is inversely proportional.

With large myomata, the weight of the tumour dragging

through its attachment on the weakened uterine wall is also an important factor.

Here it may be mentioned that traction on extruding myomata readily causes inversion, and some cases are no doubt due to this cause.

The facility with which this happens was long ago recognised by the celebrated American gynæcologist Emmet, who employed traction producing inversion to facilitate the removal of these tumours. After a quarter of a century's oblivion, this method has lately been revived as a great novelty (Péan, the Landaus, etc.). In gynæcology there is evidently some truth in the saying 'Nothing new except what has been forgotten.'

The only other kind of uterine tumour, besides myoma, often complicated with inversion is sarcoma, for cancerous growths hardly ever cause it. Sarcomata generally induce great softening of the uterine wall, often forming tumours which project into the uterine cavity; and it is these conditions which predispose to inversion. On the other hand, the infiltration, contraction and induration associated with the extension of cancerous growths is unfavourable to the production of this form of displacement. In attempting to distinguish between the myomatous and sarcomatous forms of inversion, it is well to bear in mind the rarity of the latter.

The almost invariable association of the neoplastic form of inversion with marked softening and weakening of the fundus uteri corroborates the view of Matthew Duncan, as to the important part played by this condition of the fundus in the causation of post-partum inversion.

Several cases illustrative of this condition and its treatment are detailed in Chapter XII.

Intramural Myomata.

Tumours of this kind arise as small nodules in the musculature, the posterior part of the corpus and the fundus being their favourite seats. Here they remain embedded. Such formations are usually multiple; and, more than any others,

they cause great increase in the size and vascularity of the whole uterus. The musculature may be riddled throughout with small myomata of this kind, but more commonly only one of several tumours attains considerable size. The intramural position favours the development of large and vascular tumours; which present either as simple rounded masses, or as lobulated conglomerates, having extensive connections with the uterus. The greater the number of fibro-vascular bands entering the tumour from the uterine wall, the less likely is it to become stalked.

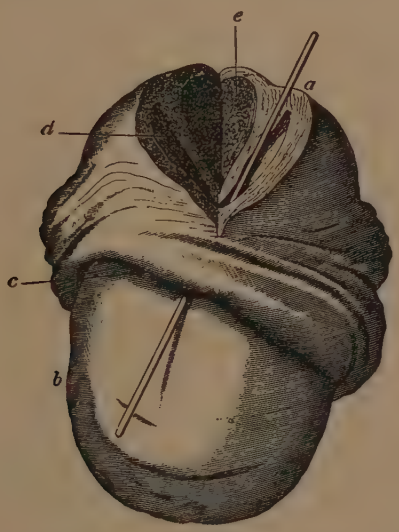

FIG. 29.—A LARGE INTERSTITIAL MYOMA OF THE ANTERIOR WALL OF THE CERVIX, SEEN FROM BEHIND. (GUSSEROW.)

a, Fundus uteri; *b*, tumour projecting through the dilated and displaced os; *c*, probe passed from the uterine cavity through the os; *d*, uterine cavity; *e*, upper end of the tumour in the anterior uterine wall.

Cervical Tumours.

Although myomata of the cervix and portio are rare, yet the disease, in this situation, often presents features requiring special notice. Their favourite seat of origin is the upper part of the posterior cervical wall. These tumours are

generally interstitial; but they nevertheless usually project, sooner or later, into the vagina. It is well to remember this when operating, as the encasing uterine tissues have to be divided before the tumour can be shelled out (Fig. 29).

Subperitoneal tumours of this locality are rarely met with.

Cervical myomata, being poor in muscle elements and bloodvessels, are of firm texture; and although they often attain considerable size, their progress is slow. These tumours rarely calcify, but they are prone to cystic changes; and being exposed to injury during examination, they often become inflamed and slough. Owing to the frequency with which they project into the vagina, and their tendency to become incarcerated in the pelvis—when they interfere with the functions of important organs—cervical myomata comparatively often give rise to symptoms demanding surgical intervention.

As these tumours increase in size they cause great elongation and distortion of the cervix, which may in this way be occluded, with retention of secretions, etc. According to the direction in which the tumour progresses, the corpus uteri may be raised or depressed; but it is seldom otherwise much altered. Tillaux has, however, met with an instance in which the whole uterus was enormously hypertrophied, from the presence of a small myoma in the cervix. The patient, who was forty-seven years old, died in hospital from the effects of menorrhagia, to which she had been liable for many years.

Cervical myomata may be concomitant with similar tumours in the corpus, but this is comparatively rare.

When the growth progresses downwards, the perivaginal structures and the parts adjacent thereto are encroached upon, until at length the tumour projects into the vagina, as a quasi-polypoid mass. It is then generally impossible to find the os. It may seem superfluous to caution the practitioner against mistaking the presenting fœtal head for such a tumour; yet this mistake has so often been made that it is as well to bear in mind the possibility of the error. As will be gathered from cases previously cited, it requires care

to distinguish an inverted myomatous uterus from an extruding cervical myoma.

An enormous cervical tumour may be seen in the Museum of the Royal College of Surgeons of England (No. 4,630, Pathological series). It grew from the posterior part of the cervix, distended the vagina, and its lower end—which was eroded—projected externally. The tumour consists of a single solid mass of very dense fibro-myomatous structure. It is 12 inches long by 5 inches broad. At its junction with the elongated cervix some faint indication of a line of demarcation is discernible. This is one of the largest uterine myomata in the museum.

Amann has lately described a specimen of cervical myoma weighing 25 pounds.

When the growth progresses upwards, the tumour is likely to become impacted in the pelvis, burrowing in the peri-cervical tissues or between the layers of the broad ligament, where it compresses adjacent structures. Under such circumstances the tumour often becomes moulded to the shape of the pelvis, etc., in a remarkable manner.

The following case, by Cullingworth, is a good example of a large cystic myoma of the cervix:

An unmarried woman, aged forty-nine, presented with a large abdominal tumour, which filled the pelvis and abdomen, extending as high up as the xiphoid. It was connected with the upper part of the posterior aspect of the cervix, the corpus being of nearly normal size. She had noticed an abdominal tumour for about a year; but nearly all of the present enlargement had supervened since the advent of the menopause, about six months previously. She had never suffered from metrorrhagia, her chief symptoms being abdominal pain and hæmorrhoids. The tumour was taken for an ovarian cyst, and laparotomy was performed. Its true nature was then recognised, and it was removed by hysterectomy, with intraperitoneal treatment of the cervical stump. The patient unfortunately died of syncope half an hour after the operation.

The tumour was 10 inches long, and it weighed 6 pounds 11½ ounces. Its abdominal part was separated from its pelvic

part by a marked constriction, corresponding to the pelvic brim, the former being much the larger. Its pelvic part was so moulded to the pelvic cavity as to form a cast of it. There were many discrete, well-defined cysts in the substance of the tumour, and several projected on its surface. These cysts contained serous or sero-sanious fluid, and varied in size from a hazel-nut to a hen's egg.

In this case, instead of the disease being arrested at the climacteric, its progress then became greatly accelerated, as not unfrequently happens.

Lewers has lately reported an interesting case in which a large myoma of the posterior wall of the cervix sloughed *en masse*, and was discharged into the vagina, through an opening formed in the bulged posterior cervical wall. A fœtid, friable mass—filling the upper part of the vagina—was removed with the fingers, the fragments weighing 2 pounds 8 ounces. The patient was suffering at the time from septic symptoms, of which she died three months later.

Recurrence.

It has occasionally been noticed, after the removal of an intra-uterine myoma, that a fresh tumour has sprung up in the same vicinity; and this phenomenon has been described as 'recurrence.' Thus applied, there can be no doubt that the term is a misnomer; for in such cases the second tumour is nearly always due to the growth of a small, unnoticed, but previously existing myoma, left behind at the time of the operation.

In certain rare cases, however, the recurrent growth manifests malignant properties. In most of these the primary tumour was no doubt also really malignant. Histologists often find great difficulty in discriminating between leiomyomatous, sarcomatous, young fibrous and chronic inflammatory formations. The contention of Klebs, Krische, and others, that ordinary myomata may recur, disseminate, and manifest malignant properties without undergoing any histological metamorphosis, should not be lightly entertained.

In this connection the following case is very much to the point:

Winckel, having removed three tumours from the interior of the uterus, at comparatively short intervals, concluded, after microscopical examination of the specimens, that the first was an ordinary fibro-myoma, and the two other round-celled sarcomata, due to 'sarcomatous degeneration' of the base of the first. Two years later Schatz removed a fourth tumour from the same patient, which he found to be nothing more serious than an inflamed myoma. When last heard of, three years after Schatz' operation, the patient was well and free from any return of the disease.

Another example of this kind of difficulty lately received a striking illustration at the London Obstetrical Society.

Routh showed a uterus that he had removed by panhysterectomy—from a sterile, married woman, aged forty-two—which contained a large soft tumour growing from the right side of the fundus. He described the tumour, after microscopical examination, as 'myxo-sarcoma.' When first seen, two and a half years previously, the patient had a large, soft, sloughing mass protruding from the vulva, which was removed, being taken for an extruding myoma. A similar tumour soon re-formed, and during the next two years similar recurrences necessitated three further operations, each with the like result. In the discussion that followed the exhibition of the specimen, nearly all the speakers regarded the tumour as a disintegrating myoma, and referred to similar cases they had seen in support of their view. A committee appointed to report on the subject said, 'We are of the opinion that this specimen is a fibro-myoma, showing extensive round-celled infiltration (inflammatory). There are no microscopical appearances of sarcoma.' Soon afterwards it was reported to the committee that the patient had died with metastases in the lungs and thoracic wall. Collective wisdom then found expression as follows: 'Taking this fact into consideration, the committee are of opinion that the growth is a sarcoma.'

There are, however, yet other rare cases of so-called

'recurrence,' in which we have to do with the supervention of malignant disease in the stump of the removed tumour, or in the track of the operation wound made for its removal; but these post-operative outbreaks are not peculiar to myomata, nor, indeed, to any kind of tumour, for they may occur after any operation, and they are akin to the condition known as traumatic malignancy.

The following instances of so-called recurrence have come under my notice:

1. A single woman, aged thirty, with a large, smooth, mobile tumour in the hypogastric and right iliac regions. On vaginal examination, the tumour presented as a hard, smooth mass, filling the pelvis and bulging into the upper part of the vagina. It was of eight years' duration, and had been painful for the last two months. The catamenia were profuse, and pain was worse at the periods, her general health being otherwise good. A large, stalked, nodular, subperitoneal myoma was removed by laparotomy, and several similar smaller tumours. The pedicles were ligatured with silk and dropped. Both ovaries and tubes were also removed. Three years later this patient again came under observation with a large myomatous tumour completely filling the pelvis, and causing intestinal obstruction. It was removed by hysterectomy.

2. A well-nourished two-para, thirty-five years old; seven years previously had a large, cystic, pediculated myoma removed by laparotomy. The right ovary and tube were removed at the same time, but no trace of the left ovary could be found. The tumour had been noticed for five years. Seven years later she again came under observation, with a large nodular tumour filling the pelvis and the lower part of the abdomen. Laparotomy was performed, and a large conglomerate fibro-cystic myoma was exposed, which was attached to the left side of the fundus uteri by a pedicle 1½ inches in diameter. Numerous other myomata were connected with the corpus uteri, many of them being pediculated. These were removed by supravaginal amputation, with extraperitoneal treatment of the pedicle. There were numerous adhesions. No trace of the left ovary could be found.

CHAPTER VII

THE BIOLOGY OF MYOMA

Mode of Increase.

MYOMATA generally increase slowly, and last a long time; but no hard-and-fast rules can be laid down as to their rate of increase. Irregularities in this respect are of common occurrence. Occasionally these tumours increase very rapidly, especially the soft and vascular kinds. I know of no adequate explanation of these variations, but they are probably mainly due to intrinsic causes. Among the extrinsic conditions that determine sudden increase of size are congestion, œdema, inflammation, etc., which are generally due to microbic infection, the consequence of some form of injury.

According to Schorler, in a general way, myomata seldom form a clinically appreciable tumour in less than a year, although symptoms of the disease may become noticeable after but three months' growth; in five years' time the tumour may have attained the size of a fist, and in thirteen years that of a man's head. The size of a tumour is, however, not a safe criterion as to its age; for while small and medium-sized tumours of from thirty to forty years' duration are not unfrequently met with, quite large tumours of but a few years' growth often occur.

Laennec has described a case of uterine myoma known to be of fifty years' duration, and Manley one of forty-five years.

The mode of increase of these tumours is believed to be endogenous; that is to say, the growth of each nodule being centrifugal, the youngest cells are found at its centre.

Influence of Menstruation, Pregnancy, etc.

Myomata increase in size just before and during menstruation, and decrease afterwards.* Sexual excitement, by the local congestion and increased vitality it determines, probably has a similar effect.

The influence of pregnancy on these tumours is very marked; it causes them to increase with undue rapidity, and at the same time they become more vascular, softer, and sometimes quite plastic. During involution they shrink again. The histological changes underlying these alterations are similar to those experienced by the uterine musculature itself, the muscle cells increasing in number and in size, with subsequent degeneration.

The pregnant myomatous uterus is unduly apt to get displaced or incarcerated.

Influence of the Climacteric.

It is a prevalent belief that at the climacteric myomata increase less rapidly, become stationary, or even retrograde; but this is only exceptionally true. We are specially indebted to Kleinwächter for exposing this fallacy; he has shown that after the menopause these tumours commonly continue to grow; indeed, the progress of the disease is often accelerated rather than retarded at this period. Moreover, the post-climacteric myomata are even more prone than others to such complications as œdema, inflammation, septic infection, extrusion, inversion, gangrene, etc. The experience of operative surgeons entirely accords with this. Thus Péan says, 'J'ai operé plus de personnes arrivées à la ménopause que de malades plus jeunes.' Of his 250 operated cases, 100 were between fifty and sixty years old, and 70 between forty and fifty. It is only surgeons who operate on every case, directly the existence of the disease is recognised, whose statistical lists show a larger proportion of comparatively young patients.

* Such is the general belief, but these changes have not been very carefully studied of late. According to John Williams, the enlargement takes place, not during the period, but just before and after it.

Many instances of these progressive post-climacteric myomata, in patients over sixty years old, might easily be cited. Herman has reported a case in which a tumour of this kind first appeared at the age of sixty-four—thirteen years after the menopause. Grimsdale has met with a similar case at sixty-seven, and Champneys at sixty-nine; while Tate had to remove the whole uterus for a sloughing myoma in a patient sixty-seven years old, twenty years after the menopause.

Van Rensselaer has met with a still more remarkable case, in which the patient, nearly ninety-two years old, had a large, extruding, submucous myoma successfully removed *per vaginam*. Until nine months previously, she had been quite free from any uterine hæmorrhage. She had always enjoyed excellent health, and was the mother of four children.

Another erroneous impression very generally entertained with regard to myomatous patients is that the climacteric supervenes with them, as with other women, at about the forty-fifth year. The truth is that women with these tumours usually continue to menstruate for many years after the average climacteric, even up to fifty or later; and it is remarkable that they may conceive and bear children at this advanced period.

The Question of Absorption.

Most diseases that cause great wasting exercise a staying influence on the growth of myomata, and after abdominal sections and some other operations similar results have been noticed. Heidenhain, Heard and others have reported instances of this kind, after ablation of the breast for cancer. The softer, more vascular and muscular of these tumours sometimes undergo sudden and remarkable changes of volume; and it is even alleged that they may entirely disappear by absorption. Many distinguished gynæcologists have held this opinion. Thus Barnes says: 'The reality of fibroid tumours having been absorbed is too well established to admit of doubt.' It would be easy to collect a large

number of cases in support of this thesis. It is especially after parturition, traumatism, local inflammatory complications, peritonitis, abdominal section, castration, electrolysis, etc.; after debilitating illnesses like influenza; and after the administration of drugs, such as thyroid extract, ergot, arsenic, and iodide of potassium, that such disappearances have been reported.

That myomata may be detached and extruded *en masse;* and that they may be destroyed by gangrene, sloughing and inflammatory disintegration, I have not the slightest doubt, although it is very seldom that such events are safely effected by natural processes.

But with regard to the alleged disappearance of these tumours—or, indeed, of any true tumours—by absorption, I have never been able to convince myself of its reality. The weak point in the history of these cases of reputed absorption of myomata, is that which relates to the diagnosis of the tumour; and, as to this crucial point, I have always found lack of convincing evidence. It is my belief that in such cases we have to do with inflammatory pseudoplasms, in which syphilis, tubercle, actinomycosis and other forms of inflammation play the leading part; and not with true neoplasms at all.

Septic Infection, Inflammation, etc.

Among the superinduced changes to which myomata are liable, those resulting from **septic infection** are clinically the most important. These comprise congestion, œdema, inflammation, suppuration, sloughing, and gangrene. The immediate exciting cause generally is some form of traumatism, especially wounds resulting from the use of the sound, curette, finger-nail, electro-puncture needle, etc. It is probable that myomata in close proximity with the large intestine, especially when the latter is habitually distended by scybala, may be infected by microbes from the bowel. At any rate, instances have been reported of their infection by *Bacillus coli communis*, typhoid bacilli, etc. In some

cases of gangrenous inflammation the infective process has appeared to centre in the capsule; in other cases the process is partial, affecting, for instance, only that part of a tumour which projects into the vagina.

An infected myoma increases rapidly in size from œdema and leucocytic infiltration, and at the same time pyrexia—often with severe septic symptoms—ensues. Endometritis, salpingitis, pyosalpinx, and peritonitis, are among the commonest complications of these septically infected tumours.

Pedunculated myomata, especially of the subperitoneal variety, may become œdematous and inflamed through twisting of the pedicle, etc. In some instances circumscribed abscesses, and even very large accumulations of puriform fluid—amounting to several pints—have been met with in tumours of this kind. On cutting into a large myoma, just removed from a sterile woman aged forty-three, Ingraham found that it contained two circumscribed abscesses, full of thick greenish pus; but cases of this sort are not often met with. Abscesses in myomata are sometimes of post-puerperal origin.

Left to themselves, sloughing myomata may perforate the wall of the uterus, and so find their way into the peritoneal cavity, rectum, bladder, etc.; but fatal septic complications usually ensue long ere this stage is reached.

Fibrification, Calcification, Fatty Degeneration, etc.

The commonest degenerative change to which myomata are liable is, undoubtedly, **fibrosis.** This is attended with induration, atrophy and marked diminution in size. Thus, fairly large tumours may dwindle to comparative insignificance. It is of commonest occurrence in the stalked subperitoneal forms, and its chief determining factor is defective blood-supply.

Occasionally these tumours **calcify**, and instances of their chondrification and ossification have also been reported. These changes are commonly described as 'degenerations'; but it seems more probable, in the light of recent research,

that they are due to the presence of heterotopic sclerogenous elements of congenital origin, included in the tumour *ab initio.*

Calcification is not common, for Martin reports having met with only three instances of it in 201 myomata. In the submucous variety of tumour it is of even greater rarity. Advancing age is a predisposing condition. The calcareous matter is generally deposited at numerous points throughout the tumour; but, as cretification progresses, it may be seen to follow roughly the whorled arrangement of the muscular fasciculi. After a time the various deposits coalesce, forming a hard, heavy, rugose mass; which on maceration yields a coral-like skeleton. Thus, the whole tumour may become so thoroughly cretified as hardly to be divisible with a saw; and its cut surface may be so dense as to take a polish like marble. Specimens of this kind have been met with weighing over 20 pounds.

A peripheral form of cretification sometimes occurs (*en coque*), the tumour being encased in a kind of calcareous shell.

Calcic phosphate and carbonate are the chief inorganic constituents of this sclerogenous substance.

Calcified myomata have exceptionally been found free in the peritoneal cavity, in hernial sacs, and even in the utero-vaginal canal.

Reference has previously been made to illustrative cases of this kind. In the Hunterian Museum (No. 226, Pathological series) is a large calcified myoma—5 inches long—which was found in a churchyard, and sent to Hunter as a monster urinary calculus. Yamagiwa of Tokio has lately described a calcified myoma, weighing over 6½ pounds, which was found after cremation, in the ashes of an old woman, who was known to have suffered from symptoms of the disease during her lifetime.

Instances of calcified myomata free in the utero-vaginal canal—the so-called uterine calculus—are rarer than the foregoing. Bernard has recently reported an instance; and in the Hunterian Museum (No. 4,647, Pathological series) is a

specimen, the size of a man's fist, which was removed with forceps during labour from a woman aged forty-five.

Examples of chondrifying and ossifying myomata have been described by Ascher, Bidder, Wedl, Henle, Freund, and others.

Virchow describes myomata as sometimes undergoing **fatty changes**, with subsequent regression, analogous to the post-partum changes undergone by the musculature of the gravid uterus.

Brünings has lately reported a remarkable example of this condition: on section of a tumour, the size of a child's head—removed from the anterior wall of the uterus of a woman, aged fifty-five—its cut surface presented a bright yellow appearance, and was exceedingly soft, just like fatty tissue; histological examination showed that large areas of the myomatous substance had been replaced by fatty elements.

Extensive fatty changes are, however, far from common in myomata. Infarcts and necrobiotic areas are of far more frequent occurrence, and these are often mistaken for fatty degeneration (Prokogieff). Blood stasis is one of the commonest causes of these conditions.

T. Smith has met with a polypoid intra-uterine myoma which, in addition to a cyst, contained also a small fatty tumour. Such heterotopic formations are rare.

Amyloid changes have been described as occurring in myomata by Stratz and others.

Telangiectasic and Lymphangiectasic Forms.

In certain of these tumours, especially of the softer kind, the bloodvessels and lymphatics occasionally become largely developed, giving the tumour a cavernous aspect on section, like that of a vascular sponge. Such tumours may pulsate. These varieties are apt to undergo rapid changes of size, in which muscular contractility, as well as vascular distension, is concerned. Virchow designates those growths in which the bloodvessels are unduly developed, as telangiectasic myomata; while Fehling and Leopold, having studied cases

in which the abnormal vessels were demonstrably lymphatics, admit in addition a lymphangiectasic variety. Examples of the cavernous form of the disease have lately been studied by Rosemann, Grammatikati, Reichel and others.

Cystic Forms.

It is not at all uncommon to find small cysts in myomata, but any considerable cystic development is comparatively rare. Martin reports having met with only eight instances of it, in his 201 cases.

Subperitoneal tumours—especially those connected with the fundus and its vicinity—are much more prone to cystic changes than any others. Of seventy cases collected by Heer, sixty-three were subperitoneal (only twelve being distinctly stalked), five were intramural, and two submucous. These cysts are usually multiple, but one large cyst—often crossed with irregularly disposed bands — generally predominates; and occasionally small papillary excrescences project into its cavity. Cystic myomata often attain great size, the cysts containing gallons of fluid. Indeed, examples of this form of the disease—as previously mentioned—furnish some of the largest tumours known.

Of thirty-one cases tabulated by Spencer Wells, the average age of the patients was 40·5 years, the youngest being 25 and the oldest 63. They generally run a chronic course. It is alleged that cystic myomata are more prone to originate malignant disease than solid myomata; but I believe this is due to cystic sarcomata and myxomata often being mistaken for true cystic myomata.

These tumours are specially prone to congestion, œdema, septic infection, torsion of the pedicle, and other inflammatory complications; hence the large pus-containing cysts of which many examples have been reported. In a case lately described by Bernays, a tumour of this kind contained 6 gallons of puriform fluid.

Cystic tumours are relatively often complicated by peritonitis, adhesions, hydroperitoneum, intestinal obstruction,

etc., and the cysts have been known to rupture, discharging their contents into the peritoneal cavity, etc., sometimes with sudden fatal results.

Clinically, cystic myomata are of special interest, because of the difficulty of distinguishing them from ovarian cysts; and because they run a far more lethal course than the solid forms.

For pathologists their genesis is a subject of keen controversy.

At the outset we have to distinguish between true cysts, which have a special lining membrane; and pseudo-cysts, which result from the disintegration of pre-existing structures, and have no special lining—the 'géodes' of French authors.

By far the most important outcome of recent researches as to the origin of the true cysts, is the demonstration that most of them arise from embryonic or post-embryonic epithelial inclusions ('rests') of Wolffian, Müllerian or mucosal origin. Diesterweg was one of the first to detect epithelial-lined cysts in myomata, having found—in a polypoid intra-uterine tumour—cystic cavities lined by columnar ciliated epithelium. In a large tumour removed from a woman, aged forty-six, which contained nearly 12 pints of thick grayish fluid, Brens found a congeries of cysts of all sizes, lined with cubical ciliated epithelium, which he believed to have arisen from Wolffian residua. It is also probable, as I have previously mentioned, that some of these cysts arise from sequestrated portions of the uterine mucosa and its glands, which have become included in the myomatous new formation.

The old belief that certain forms of cystic disease are of telangiectasic and lymphangiectasic origin is, however, by no means discredited by these newer observations; for an endothelial lining has been demonstrated by many observers in certain cysts, whose fluid contents are spontaneously coagulable, rich in leucocytes, and even in blood. Most of the blood cysts of the older authors are, however, now discriminated as angio-sarcomata.

The contents of myomatous cysts vary from thin clear serous fluid, to thick grumous pea-soup-like liquid; and their colour is equally variable.

With regard to the pseudo-cysts, these are not common, except in connection with myxomatous and sarcomatous new formations.

It was formerly thought that this kind of degeneration often arose in myomata, from the softening of œdematous, hæmorrhagic or necrobiotic areas; but cysts thus arising are now known to be quite exceptional.

Myoma Mucosum.

There still remains a form of tumour requiring separate mention, and that is the myxomyoma of Virchow, which corresponds with the 'soft œdematous myoma' of Tait. It is commonly described as the outcome of the mucous degeneration of an ordinary myoma; but, as Virchow has pointed out, there is really myxomatous new formation. Consequently such tumours manifest all the properties of myxomata; that is to say, they cannot be regarded as perfectly innocent formations. Myxomyomata are rare, solitary *ab initio*, and circumscribed; and they are often complicated by the formation of pseudo-cysts.

CHAPTER VIII

THE COMPLICATIONS OF MYOMA

Changes in the Uterus, Ovaries, Tubes, etc.

MYOMATA, especially when multiple and large, cause great alterations in the size and shape of the uterus. The whole organ is often elongated, and more or less displaced thereby —versions and flexions being common. Such accidents may lead to the locking and incarceration of the displaced organ in the pelvis, etc. The uterus may be so altered and disfigured by the combined action of these causes, as to be irrecognisable without the aid of such landmarks as the tubes and round ligaments, which in the myomatous organ are nearly always much enlarged.

I have previously described the pressure atrophy caused by these tumours; and pointed out how it predisposes to inversion.

Champneys has reported a remarkable case, in which a large myoma of the posterior wall of the uterus, caused almost complete atrophy of the rest of the organ; which formed a covering for the tumour, no thicker than a sheet of blotting-paper. There was also a calcified myoma in the right broad ligament. The patient was sixty-nine years old.

Another effect produced by nearly all kinds of myomata—except the stalked subperitoneal—is hypertrophy of the musculature. This is especially noticeable with tumours that project into the cavity of the organ; and with those that are embedded in its walls. When the tumour is connected

with the corpus, this hypertrophy usually affects the whole musculature; but myomata of the cervix seldom induce much enlargement of the corpus. Sometimes the hypertrophy is enormous; thus, Kelly mentions a case in which, with a moderately-sized tumour, the uterus by itself weighed 645 grammes, its normal weight being about 45 grammes.

By these means, the uterine cavity is greatly distorted, its rectilinear axis being hardly ever preserved. Such conditions predispose to obstruction and occlusion of its lumen, with the consequent accumulation of fluids within, leading to the conditions sometimes designated 'cystic uterus,' which comprise hydro-, pyo-, hæmato-metra, etc.

The mechanical disturbances of the circulation caused by these tumours nearly always induce congestion, in which the mucosa as well as the musculature participate. In the immediate vicinity of the tumour, the pericapsular blood-vessels are greatly enlarged; indeed, the vascularity of the whole uterus and of the neighbouring parts is always excessive. This accounts for the proneness to metrorrhagia.

The condition of the mucosa in these cases has given rise to contradictory reports; and no doubt it is not always affected in precisely the same way, much depending upon the size and position of the tumour. It is, however—as Wyder has demonstrated—generally thickened, owing to hyperplasia, in which both the glandular and stromal structures participate; and this hyperplasia frequently eventuates in the formation of mucosal polypi, especially in the vicinity of the cervix and os (Fig. 27, P, P, P). The mucosa of the tubes may be similarly affected. There seems to be no basis for the belief of Virchow and his followers, that conditions of this kind are the causative antecedents of myomata.

As pointed out by Schmal and Semb, where the mucosa is much compressed by the tumour, atrophic or sclerotic changes—causing thinning—predominate. This is the case when a tumour of some size projects into the uterine cavity, carrying the mucosa before it. Under such circumstances the thinned mucosa is easily eroded; hence the frequency of

hæmorrhage, the persistence of which may be ascribed to the local congestion, while the tense condition of the bleeding vessels prevents their retraction. Owing to these causes the mucosa over extruding myomata is soon partially destroyed, only patches of it persisting. The mucosa of the uterine wall, opposite these projecting intra-uterine tumours, may be either thinned or thickened, according to the degree of pressure there experienced. Such are the chief factors concerned in the hæmorrhage associated with myomata.

Tubercle and syphilis are occasionally seen in the myomatous uterus, etc., of which Edebohls and Prochownick have lately reported instances; and actinomycosis may also be found.

Various morbid conditions of the adnexa often occur. Among the commonest tubal affections are hypertrophy, salpingitis, hydro-, pyo- and hæmato-salpinx, which are frequently bilateral.

Pyosalpinx is one of the most dangerous complications of myomata, since death may occur at any time from rupture of the distended tube into the peritoneal cavity. It is especially apt to complicate inflamed, sloughing and gangrenous tumours. Of twenty-three necropsies on myomatous women in my list, there were three instances of pyosalpinx. Gow reports having met with pyosalpinx four times in forty-seven operated cases.

The following illustrative case has been reported by Gervis. The patient, a sterile married woman, aged thirty-eight—with a large spontaneously extruding submucous myoma, in a state of slough—died of peritonitis, shortly after the onset of inflammatory symptoms connected with the tumour, which was of many years' duration. No surgical treatment had been undertaken. At the necropsy, the vagina was found filled with a large gangrenous myoma, which was connected with the posterior wall and the fundus of the uterus. There was double pyosalpinx; and the fatal peritonitis resulted from the rupture of the right pus-containing tube, and the discharge of its contents into the peritoneal cavity. This case shows the necessity for removing extruding tumours

per vaginam as soon as their presence is recognised; and the supervention of inflammatory symptoms in this connection is an urgent indication for operation.

Cysts ('hygrômes sous-séreux') and hæmatomata of the broad ligaments are often observed.

The ovaries are always more or less diseased. They are congested and enlarged, owing to hyperplasia of the stroma with overgrowth of the follicles, the former lesion usually predominating. Their bloodvessels are thickened, and small cysts are frequent. Sometimes there is well-marked ovaritis, with œdema of the stroma; and even ovarian abscess may be met with. According to Tait and others, these ovarian lesions cause the uterine myomata; but it seems to me more likely that they are the consequence, rather than the cause, of the uterine disease.

Pelvic peritonitis in the vicinity of the ovaries and tubes is frequent; and owing to this the ovaries and tubes are often displaced and bound down by adhesions, so that on opening the abdomen it may be difficult to find them.

In the preceding chapter I have referred to the great frequency with which ovarian cysts, dermoids, etc., complicate myomata.

Hydroperitoneum and general peritonitis are comparatively rare; and when met with they are usually associated with stalked, subperitoneal tumours.

The worst cases of general peritonitis are due to the rupture of pyosalpinx, ovarian or other abscesses, sloughing myomata, cysts, etc., discharging their contents into the peritoneal cavity; moreover, severe peritonitis is often associated with incarcerated tumours, and it may occur as a consequence of intestinal obstruction.

A few fatal cases of peritonitis due to perforating duodenal and gastric ulcers have also been recorded, mostly after hysterectomy.

Pyrexia with myomatous disease nearly always indicates the presence of some inflammatory complication, either of the tumour, the uterus, the adnexa, or of adjacent structures, especially the peritoneum.

Uterine myomata predispose to umbilical hernia, for in twenty-four patients Péan met with no less than three examples of this affection.

Pressure Complications.

As they increase in size, myomata tend to rise out of the pelvis, and to extend themselves in the abdominal cavity. Any conditions which impede or prevent this extension, favour the production of pressure complications. Thus, myomata may be incarcerated in the pelvis by the unyielding nature of their uterine surroundings, by adhesions, by intra-ligamentous extension, by pregnancy, by sudden increase in size causing locking, by extrusion *per vaginam*, by flexions, versions and other displacements, which are often attended with more or less inflammatory swelling of the tumour. Myomata arising from the cervix and parts of the uterus adjacent thereto, are especially apt to be retained in the pelvis, owing to the unyielding nature of their surroundings.

The earliest symptoms of pressure complications are those of pelvic congestion, with frequent, painful, or difficult micturition. These are worse at the catamenial periods. Subsequently there may be retention of urine with cystitis. Hydronephrosis and its consequences are occasionally met with; but this condition is far more frequently caused by cancer than by myoma, for myomatous tumours generally push the ureter aside. Difficult and painful defæcation, eventuating in more or less obstruction of the bowel, is another important pressure complication, although of less frequent occurrence than vesical disturbance. Hæmorrhoids are occasionally thus caused.

In like manner, œdema of the foot and leg, with enlargement of the veins, is met with in a certain number of cases; but this symptom also is more frequently caused by cancer than by myoma. The same is true with regard to neuralgic pain owing to pressure on the intrapelvic nerves.

Constitutional, Cardiac and other Complications.

Large tumours of some duration, usually cause more or less deterioration of the patient's health, even in the absence of sloughing, hæmorrhage, pyrexia, etc. Nearly half the patients under my observation presented marked signs of this kind, and several others manifested minor degrees of deterioration. Pallor, weakness, emaciation, sallowness, depression, and loss of appetite, are among the more obvious symptoms thus induced. As the disease progresses these become aggravated, and other indications of profound disturbance of the general nutrition appear. Among these mention must be made of the protean neurotic disturbances —often of hysterical type—to which myomatous women are specially liable, hence the headache, neuralgia, insomnia, bad temper, etc.; and sometimes there is a tendency to alcoholism. Dyspepsia, nausea, vomiting, and other gastro-intestinal disturbances, may also be met with. These patients often present an emaciated, worn, and depressed aspect, the corners of the mouth drawn down, the cheek-bones prominent, the nose sharpened, and the brow furrowed (facies uterina). Large ovarian tumours may cause similar symptoms.

It seems probable that this condition—like the cancerous cachexia—is the outcome of a general toxæmia caused by excrementitious products, derived from the tumour, finding their way into the general circulation in quantities too great to be quickly eliminated.

Large myomata are often complicated by cardiac disease, which may end fatally, as mentioned in the next section. Of eight unoperated myomatous patients in my list, who died of the disease, in two cases the fatal termination was due to morbus cordis. Péan met with four severe instances of cardiac disease in his twenty-four myomatous patients; and Hofmeier has reported eighteen cases of sudden death from heart disease, secondary to myomata and other large abdominal tumours.

Just as in pregnancy, the increased vascular pressure reacts

on the cardiac muscle, causing hypertrophy of the left side; which is soon followed by degenerative changes with dilatation, etc.—hence the palpitations, precordial pains, syncopes, dyspnœas, and shortness of breath, experienced by these patients. The anæmic and cachectic states resulting from large tumours, and the long-continued losses of blood often associated with smaller tumours, accelerate these cardiac degenerative changes, with which valvular disease is generally associated. According to my experience, the large, soft, flabby dilated heart, is the form of cardiac affection usually met with in these cases; and the concomitant lesions are such as I have mentioned in the next section.

Pulmonary embolism, consequent on thrombosis, is one of the most dangerous complications of myomatous disease; and many examples of death from this cause have lately been reported, *e.g.*, by Gessner, Mizuch, and others. Among the causes tending to favour the production of this condition—in addition to the anæmic and cachectic states above mentioned—are septic inflammatory processes originating in the tumour or its vicinity, septicæmia, cardiac disease, and injury to adjacent veins, whether owing to their compression by the tumour, injury during examination, or during the course of operations, etc. Pregnancy increases the liability to this kind of accident.

Embolism of the large branches of the pulmonary artery generally results from the detachment of thrombi from the large veins of the pelvis or its vicinity, which generally cause sudden death. Smaller emboli, lodging in the pulmonary capillaries, are of less gravity, and they are commonly recovered from. Undue rapidity and softness of the pulse often presage these attacks.

Besides the heart, fatty changes often affect the liver, kidneys, aorta, large arteries, etc.; and in some instances amylosis has been observed, especially with very large tumours.

Glycosuria, as a complication of myomatous disease, has occasionally been noted (Péan, Giles, etc.); so also has albuminuria, but the latter is generally due to compression

of the ureter or to renal disease. Ozenne has lately reported an instance of sudden death from uræmic coma in a myomatous patient of fifty. Acetonuria has been met with by Bossi and Hartmann.

A few cases of tetanus and eclampsia have also been noted in association with myomata.

The Mortality and Causes of Death of Unoperated Myomatous Patients.

Of 211 women consecutively under treatment for more or less urgent symptoms due to myomata, I have found that eight unoperated patients died, or 3·8 per cent.

In three cases acute **peritonitis** was the cause of the fatal ending; one being due to the bursting of an ovarian abscess into the peritoneum (double pyosalpinx also being present); another to ruptured fæcal abscess caused by partial obstruction of the rectum by the tumour; and the third was due to a sloughing myoma of the corpus, opening into the peritoneal cavity.

In two cases death was due to **heart disease.** Of these, in one case the lesions were—endocarditis, mitral stenosis, and dilatation; in the other there was a large flabby dilated heart, with vegetations on the auriculo-ventricular and aortic valves.

The three other deaths were due to the following causes: (1) Recto-vaginal and peri-anal fistulæ caused by pressure of the myomatous tumour on the rectum; (2) septicæmia secondary to a sloughing cervical myoma; (3) emphysema, bronchitis, and chronic cardiac disease—in the shape of thickening and beading of the mitral and aortic valves.

Peritonitis, cardiac disease and septicæmia are therefore the chief causes of death in unoperated cases.

In further illustration of this subject I append an analytical summary of twenty-two necropsies,* showing the morbid conditions usually associated with myomatous disease:

* In fourteen of these cases death supervened consequently on operation, the causes being as follows: Peritonitis in nine cases (after supra-

Of the **Lungs**:

Old pleural adhesions (extensive)	...	in 4 cases
Emphysema	...	,, 3 ,,
Hypostatic congestion ...	...	,, 3 ,,
Obsolete tubercle	...	,, 2 ,,
Bronchitis and emphysema...	...	,, 2 ,,
Œdema and congestion ...	...	,, 1 case
Double hydrothorax ...	...	,, 1 ,,
Normal	...	,, 11 cases

Of the **Heart**:

Valvular disease (mostly chronic)	...	in 6 cases*
Fatty degeneration ...	...	,, 5 ,,
Hypertrophy and dilatation	...	,, 3 ,,
Atheroma of aorta ...	...	,, 3 ,,
Small	...	,, 1 case
Normal	...	,, 12 cases

Of the **Liver**:

Fatty degeneration ...	...	in 3 cases
Cloudy swelling	...	,, 2 ,,
Anæmic	...	,, 2 ,,
Congestion with fatty changes	...	,, 1 case
Nutmeg	...	,, 1 ,,
Normal	...	,, 12 cases

Of the **Spleen**:

Enlarged and congested ...	...	in 3 cases
Pale and small	...	,, 2 ,,
Indurated	...	,, 1 case
Numerous small infarcts ...	...	,, 1 ,,
Normal	...	,, 15 cases

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vaginal amputation in five, after oöphorectomy in two, after removal *per vaginam* in one, and after abdominal myomectomy in one); shock in three cases (after supravaginal amputation); septicæmia in one case (after supravaginal amputation); calculous pyelo-nephritis in one case (after oöphorectomy).

* Auriculo-ventricular in four, mitral in three, stenosis in two, aortic in three—in various combinations.

Of the **Kidneys**:

Hydronephrosis (R 2, B 2)...	... in	4 cases
Chronic nephritis (small granular)	... ,,	3 ,,
Large fibro-fatty ,, ,,	... ,,	3 ,,
Acute interstitial nephritis	... ,,	1 case
Small pyæmic abscesses ...	... ,,	1 ,,
Pyonephrosis (B)	... ,,	1 ,,
Anæmic	... ,,	1 ,,
Calculous pyelo-nephritis (L)	... ,,	1 ,,
Normal	... ,,	7 cases

Of the **Bladder**:

Acute cystitis	... in	3 cases
Small and contracted ...	... ,,	1 case
Hypertrophied and sacculated	... ,,	1 ,,
Normal	... ,,	17 cases

Of the **Gastro-Intestinal Tract**: Besides the cases of peritonitis consequent on operation, and those met with in the unoperated cases, as mentioned above, two other cases of general peritonitis were met with, one (acute) due to the bursting of a pyosalpinx, and the other (chronic) due to inflammatory changes which had spread from the pelvis. In one case left lumbar colotomy had been performed two years before death, for the relief of chronic intestinal obstruction, caused by pressure of a tumour locked in the pelvis on the rectum.

Pyosalpinx was present in three cases, all double; and **ovarian cystomata** in two cases.

CHAPTER IX

THE QUESTION OF THE ORIGIN OF MALIGNANT FROM MYOMATOUS TUMOURS

IMPORTANT practical issues are involved in the solution of the question, as to the alleged liability of non-malignant neoplasms to become malignant. If any such tendency really exist, then these neoplasms ought to be extirpated as soon as possible. Widely divergent opinions have been expressed on this subject.

Prior to the application of the microscope to the study of new growths, it was generally believed that every chronic tumour ('scirrhus'), either was malignant or tended to become so.

The difficulty of then discriminating between malignant and non-malignant tumour-like swellings, rendered some such belief inevitable; but, since the establishment of this differentiation, it is surprising to find the old creed still so influential.

We now have to inquire whether in the light of modern research this belief is justifiable.

Since innocent neoplasms may inflame, suppurate, ulcerate, necrose and degenerate, just like physiological parts of the body, it seems not unreasonable to suppose, on *à priori* grounds, that they may also become the seats of malignant disease. The occasional coexistence in the same organ of benign and malignant neoplasms favours this view. Such are the chief considerations which have given rise to the common belief, that innocent tumours are peculiarly apt to become malignant.

On critical examination of the subject, two considerations have much impressed me. The first is the extreme rarity with which these two kinds of neoplasms coexist in the same organ; so that, even if we admit that malignant transformation takes place in all such associated neoplasms, the event must be one of great rarity—very much rarer than it would be if non-malignant neoplasms were especially prone to become malignant.

The second consideration is the inconclusiveness of the evidence as to the malignant growths, in most of these cases, having sprung from their non-malignant associates. In many instances it is perfectly evident that the association is a mere coincidence, each neoplasm having originated independently.

In other cases, the coexisting neoplasms are more closely associated; but, even in these, the appearance of the non-malignant neoplasms is often such as hardly to countenance the belief, that the malignant disease had sprung from them.

With regard to the uterus, it must be borne in mind that myomata are of very frequent occurrence; according to Bayle, 20 per cent. of all women over thirty-five are thus affected. If this estimate be correct—and so far as I can judge it is not very wide of the mark—these neoplasms are very much commoner even than cancer. Hence, considering the great frequency of both diseases in women of a certain age, we need not be surprised to find them coexisting in the same uterus rather frequently. Thus, of 78 uterine cancer necropsies of my list, in 5 there were concomitant myomata; and of the 45 similar necropsies tabulated by Lebert, 6 were associated with myomata; thus, in these 123 uterine cancer necropsies, myomata coexisted in 11, or in 9 per cent.

1. In the immense majority of cases—in four-fifths of those under my own observation—the two neoplasms were quite separate and independent of one another—the myoma having sprung from the corpus and the cancer from the cervix or portio—so that in these cases there could be no question of the latter disease having originated from the former.

2. In the remaining cases the coexisting neoplasms were much more closely associated, most of them arising in the corpus. A common condition is to find one or more small subperitoneal or intramural myomata, with cancer of the mucosa. Under these circumstances the myoma is seldom cancerous. Of course, when the cancerous disease spreads widely, even myomata such as these may be at length invaded.

A good many instances have been recorded of myomata projecting into the uterine cavity, and bearing on their surface a cancerous growth or ulcer. In cases of this kind, the cancerous disease usually spreads from the mucosa to the myoma by way of the perivascular lymphatics. In like manner uterine fibroids, projecting into the abdomen, sometimes become cancerous, through extension of the disease from adherent neighbouring organs, such as the ovary, intestine, and omentum. There is yet another way in which myomata may possibly be secondarily invaded by cancer; and that is by dissemination from a primary focus elsewhere, of which Schaper has reported an instance, the primary disease being in the lung.

3. In such cases as the foregoing, there is, of course, no question of the cancerous disease having primarily originated in the myoma. Indeed, this is an event of such rarity that, notwithstanding the great activity of modern pathologists, only about a dozen instances of it have hitherto been recorded; and in many of these the evidence adduced is far from being thoroughly convincing. Although Martin somewhat cavalierly rejects these cases on this account, there can, I think, be no doubt as to the reality of the occurrence. The following example of it has come under my own observation:

The patient, a single woman, aged forty-three, in a very feeble and emaciated condition, had suffered from pain and difficulty in defæcation for the last twenty-five years. A few months previously an abscess formed in the left ischio-rectal region, whence a fistula resulted, and subsequently cancerous ulceration. On examination, a crater-like cancerous ulcer occupied

the left ischio-rectal region. A fistulous tract, discharging fæcal matter, passed from its base into the rectum. There was no vaginal discharge, nor was the portio ulcerated. Left lumbar colotomy was performed, but the patient died of exhaustion twenty-six days later.

At the necropsy, the pelvic contents were found matted together. The uterus, distended to the size of a man's fist, completely filled the pelvis. To it the rectum and ileo-cæcal part of the intestine were adherent. The former was compressed against the sacrum. Immediately above the seat of compression, a fistulous tract passed from the bowel to the ulcer in the ischio-rectal region. In the posterior wall of the lower part of the uterus, there was a distinctly encapsuled, ovoid new growth, the size and shape of a lemon, presenting the appearance of an intramural fibromyoma, infiltrated with colloid cancer. At its periphery, in a few places, the colloid growth had invaded the adjacent parts, especially the connective tissue between the lower part of the rectum and the enlarged uterus. Opposite the posterior wall of the bladder, the capsule of the tumour had given way; and the cancerous disease had fungated into that viscus. Some of the adjacent pelvic lymph glands were infiltrated. The colloid growth presented as pale, yellowish-white, translucent, coarsely granular substance. In some places it was soft and gelatiniform; in others it partook more of the nature of schirro-colloid. There were no metastases. Both ureters were dilated, and there was left pyonephrosis with acute nephritis and atrophy.

The disease had the appearance of being much more advanced within the capsule of the myoma than elsewhere. It had invaded neither the mucosa of the rectum, nor that of the portio. Hence I conclude that it really originated in the myoma.

Histological examination revealed a scanty, fibrous, alveolar structure, the alveoli containing colloid substance. In many of the sections a layer of columnar epithelial cells, lining the alveoli, could be traced, most of the cells being in an advanced stage of granular degeneration. The presence of these lining cells, together with the occasional appearance here and there of tubules lined by columnar cells, in which degenerative changes had made but little progress, enabled me to recognise the primitive morbid condition as glandular cancer of the tubular type. The section showed in some places tracts of fibromyomatous tissue.

Legnieu and Marien, Coe, Liebmann, Gläser, and others, have also reported instances of cancer originating in uterine myomata.

If such conditions were of frequent occurrence, cancer of the uterus would be more frequently met with in the corpus than elsewhere, for it is here that over 90 per cent. of all uterine myomata originate; but we know that only about 5 per cent. of uterine cancers arise from the corpus.

The germs of this form of malignant disease are, no doubt, the aberrant epithelial elements; which, as I have pointed out in Chapter V., are so frequently included in myomatous tumours.

It is evident from the foregoing, that there is no real incompatibility between uterine fibromyoma and cancer, as Cruveilhier believed. At the same time, the extraordinary rarity of this morbid conjunction is certainly noteworthy. In short, it follows from what has been stated; that, far from uterine myomata having any special proclivity to become cancerous, they are very much less liable to originate this disease than are the glandular elements of the uterus itself.

Some pathologists have ascribed the association of cancer with uterine myomata to 'irritation,' excited by the presence of the latter and the consequent hyperplasia of the mucosa. Thorn has reported an instance of this kind, in which the cancerous disease appeared to have been caused by the presence of a large calcified myoma. If this alleged causation were of common occurrence, we should expect to find fibromyomata more often concomitant with uterine cancer, than with any other local variety of cancerous disease. But this is not so, for myomata coexist with uterine cancer only in 9 per cent. of the necropsies; whereas I have found that they coexist with cancer of other localities to the extent of 18·5 per cent.* It is evident, therefore, that the changes excited in the uterine mucosa, etc., by the presence of myomata do not specially predispose to cancer.

* Of forty-four breast-cancer necropsies, I found uterine myomata in five; and of thirty-seven necropsies for cancer in other localities, myomata were present in ten cases.

According to Chiari, the subjects of uterine myomata are unduly prone to cancer. Of 25 women with myomata under his observation, 2 had cancer of the uterus, 1 cancer of the breast, and 6 had cancer of other organs. This is a very slender basis on which to rest such a sweeping statement. If Chiari's view were correct, we should expect to find uterine myomata much more frequently in the cancerous than in the non-cancerous. But of 159 female cancer necropsies in my list, myomata were present only in 20, or in 12·5 per cent.; whereas, according to Bayle, myomata are found in 20 per cent. of all women over thirty-five. Hence Chiari's conclusion must be rejected.

Passing now to the consideration of the alleged proclivity of uterine myomata to become sarcomatous, the first fact that strikes me is the great frequency of the former and the great rarity of the latter disease. My analysis of 2,649 consecutive cases of uterine neoplasms shows 883 uterine fibromyomata, and only two sarcomata. In Gurlt's analysis of 4,115 uterine neoplasms, the proportion of myomata to sarcomata is as 481 to 8. Of 205 hysterectomies for myomata of the corpus, Martin found four of the tumours sarcomatous; and of 409 myomata, similarly examined by Fehling, only 2·2 per cent. were sarcomatous. It is evident from these data that uterine myomata seldom become sarcomatous; in fact, the metamorphosis is very much rarer than it would be, if these tumours really had any special proclivity that way.

Nevertheless, the fact of the occasional origin of sarcomatous disease in uterine fibromyomata, has been clearly established by many well-recorded examples. In this connection it must be remembered that myomata are of composite build, including connective tissue, muscle elements, bloodvessels, and lymphatics, from either of which the sarcomatous metaplasia may arise. Hence corresponding varieties of the disease. Thus, when the morbid process centres in the connective tissue, its elements multiply, destroying the adjacent fibrous tissue, muscle cells, etc. (myosarcoma, myomyxoma, etc.); when the bloodvessels

and lymphatics are chiefly involved we get telangiectasic (*myosarcoma telangiectaticum*) and lymphangiectasic varieties (*myosarcoma lymphangiectaticum*). In other instances the muscle elements are alleged to be primarily affected, and to increase at the expense of the remaining constituents (*myoma sarcomatosum vel myoma levicellulare malignum*). In their recurrences and metastases each of these varieties usually breeds true.

The occasional occurrence in these tumours of cartilaginous and even truly osseous structures (Henle, Bidder, Freund, etc.) points to the probability of the sarcomatous disease being, in certain cases, of blastogenic origin.

By far the commonest variety of the disease is the myosarcomatous. In such neoplasms round- and spindle- celled elements predominate, and there is often a mixture of these. They usually present as polypoid tumours, projecting either into the peritoneal sac or into the uterine cavity; but exceptionally they are embedded in the musculature of the parietes. Their form is nearly always circumscribed, and they are often encapsuled. Their consistence varies with the amount of fibrous tissue present. The following typical example is by Finlay:

A single woman, aged fifty-nine years, had noticed an intra-abdominal tumour in the region of the uterus for fifteen years. It had caused no special trouble until 'quite recently,' when it rapidly enlarged. She died of acute peritonitis shortly after coming under observation.

At the necropsy a smooth, encapsuled, globular tumour, the size of a fœtal head at birth, was found attached to the fundus uteri by a short narrow pedicle. Its summit was in a state of incipient disintegration. In this vicinity several coils of small intestine were adherent, one of which was perforated by a spur of the neoplasm. The adjacent part of the bladder was similarly affected. The rest of the tumour presented the appearance of a soft fibromyoma. An ordinary subperitoneal 'fibroid,' the size of a walnut, was attached to the right side of the uterus posteriorly. The cervical mucosa presented several small mucous polypi. Secondary nodules were found in the base of the right lung, in

the wall of the left ventricle of the heart, in the left kidney, and in an infraclavicular lymph gland on the left side. On histological examination the uterine tumour was a myosarcoma, in which groups of round- and spindle-shaped cells were interspersed with fibrous tracts containing unstriped muscle cells. The secondary growths were of similar sarcomatous structure, only the round-celled elements were more abundant.

Ott, Ullmann, Dickinson, Schreher, and many others, have recorded cases of this kind.

Examples of myomyxoma have been reported by Franqué, Godson, Solly, Fenger, Gusserow, etc.

Aslanian, Kahlden, Johannovsky and others, have detailed cases of the telangiectasic variety; while we are indebted to Pick, Keller, Fehling, and Leopold for the description of instances of the lymphangiectasic form.

Examples of myoma malignum have been reported by Langerhans, Kahlden, Whitridge Williams, Doran, etc. In this variety of the disease the primary and secondary growths consist largely of spindle-celled structures, which are believed to be identical with the organic muscle cells of ordinary fibromyomata. In short, it is alleged that the structure of these tumours is that of embryonic leiomyomatous tissue. In estimating the value of this distinction, everything depends upon the significance attached to the spindle-celled elements, as to whether these represent young connective or myomatous tissue. In most of the cases of so-called myoma malignum, hitherto recorded, the evidence adduced as to the myomatous nature of the spindle-celled constituents, seems to me to be far from conclusive. No one seems to have applied to the examination of these structures the special technique and reagents, requisite for the differentiation of leiomyomatous tissue. The fact that organic muscle cells may multiply by karyokinesis and produce new elements has, however, been demonstrated by Busachi and others.

It follows from what has been stated that the possibility of myomatous neoplasms taking on malignant characters cannot be denied; but this is a very different thing from admitting that such neoplasms are specially prone to become

malignant. This is disproved by the great rarity of the coincidence. Non-malignant uterine neoplasms have no special proclivity to malignant disease; on the contrary, as I have shown, they are less prone to originate such changes than are the morphological elements of the uterus itself.

In other parts of the body, where I have specially studied the question, I have found that this conclusion is equally valid.

CHAPTER X

THE GENERAL PATHOLOGY OF MYOMA

The Frequency of Myomatous Disease, its Mortality, etc.

It is a matter of the first importance—especially from the surgical point of view—to gauge the frequency of myomatous disease in the general population, and the mortality resulting from it. Unfortunately, no statistics are available dealing directly with this subject; and the Registrar-General's classification is so faulty, that myomata are not even discriminated from other uterine diseases.

In spite of these difficulties, it is, I believe, possible—by indirect means—to arrive at tolerably correct conclusions.

It may be safely asserted that uterine myomata are exceedingly common.

According to Bayle, 20 per cent. of all women over thirty-five are subject to these tumours; and with this estimate Rokitansky, Lee, and others agree. So far as I can judge, it is fairly accurate, for of 159 necropsies on women, who had died of cancer of various organs, I found uterine myomata in 20, or in 12·6 per cent. Of 440 necropsies on women thirty-five years old and upwards, who had died of various diseases, Winckel reports that myomata were noticed in 66 cases, or in 15 per cent. Of 462 surgical post-mortems at St. Bartholomew's Hospital, on women over thirty years old, myomata were found—according to Champneys—in 67 cases, or in 14·4 per cent.

In making post-mortem examinations, small myomata are

often overlooked, so that the disease is no doubt commoner than these post-mortem records indicate. Thus, Bayle's estimate is probably correct.

On this basis, I calculate that there would be about 1,000,000 myomatous women in our present population. According to the reports of the Registrar-General, about 700 women die annually of 'diseases of the uterus and vagina,' under which heading myomata are included—probably furnishing most of the cases over thirty-five years of age, for puerperal and malignant diseases are excluded.* Reckoning the deaths from myomata at 500 per annum, the mortality from this cause for the whole community would be 1 in 2,000, which, in the absence of more exact information, I accept as an approximately correct estimate; at any rate, the mortality is certainly not higher than this, although it may be considerably lower.

I think it is seldom realised, by those concerned in the teaching of pathology, that, of all non-malignant tumours, uterine myomata are by far the commonest; thus, of 5,010 consecutive cases of non-malignant tumours of all parts of the body, in both sexes, I have found that no less than 883, or 17·6 per cent., were uterine myomata; and of 3,886 females in this list, 22·7 per cent. were affected with these tumours.

It may be said that about 10 per cent. of all tumours in women are uterine myomata.

Symptoms of the disease generally appear during the prime of sexual life, undue loss of blood at the catamenial periods, and subsequently at other times, together with menstrual disorder, being the earliest indications.

There can be no doubt as to the desirability of submitting these remarkable formations to more careful study than they have hitherto received, for they often constitute a serious disease.

* The report for 1897 shows 745 deaths due to 'diseases of the uterus and vagina'; 229, being under thirty-five years of age, may be disregarded for our purpose, very few deaths being due to myomata until later in life. The 1898 report shows 682 deaths from uterine diseases, 196 being under thirty-five years of age.

Age.

Although the germs whence most myomata arise probably are of congenital origin, it is very rare to meet with tumours of this kind in early life. Of the 56 cases in my list, only 1 was under the age of twenty at the onset of the disease; of Gusserow's 953 cases, 15 were under twenty; of Winckel's 528 cases, 9, and of Emmet's 225 cases only 1 was under twenty; thus, of these 1,762 cases 26 were under twenty, or about 1·5 per cent.

Gusserow's list comprises 1 case at ten, 1 at fourteen, 1 at sixteen, 1 at seventeen, 3 at eighteen, and 8 at nineteen years.

Pick, as previously mentioned, has described a case of congenital myoma. Sasaki has met with an instance in a girl only nine years old. Laparotomy was performed for a large intra-abdominal tumour. Twenty-one uterine myomata were removed, most of them being subperitoneal; the largest measured 14 by 8 inches, the smallest being about 1 inch in diameter. The patient died of shock half an hour after the operation. The myomatous nature of the tumours was confirmed by microscopical examination.

The age at onset in 100 cases, dating from the time when symptoms were first noticed, I have found to be as follows:

Under 20	...	1 case.	40 to 45	...	16 cases.
20 to 25	...	6 cases.	45 to 50	..	6 ,,
25 to 30	...	6 ,,	50 to 60	...	4 ,,
30 to 35	...	18 ,,	over 60	...	4 ,,
35 to 40	...	39 ,,			

The average age at onset was thirty-seven years and three months.

These patients first applied for professional treatment on the average, three years and seven months after the supervention of the first symptoms of the disease, their average age then being forty years and ten months.

The oldest patient in my list was seventy-five, and there were three others over sixty.

Of Gusserow's 953 cases, 17 were over sixty, 5 of these being upwards of seventy years old.

Wright has met with a large calcified myoma at eighty-six; and Van Rensselaer with an extruding submucous myoma at ninety-two.

There are good reasons for believing that the liability to myomata increases with advancing years; thus, while it has been estimated that 20 per cent. of all women over thirty-five have these tumours, Broca reports that he found them in one-third of all the necropsies made on the old women who died in the Salpêtrière Hospital; and Klob has estimated that 40 per cent. of all women over fifty are thus affected. Of 575 necropsies on women analysed by Winckel, myomata were found in 12 per cent.; but of the women in this list, under thirty-five, only 5 per cent. were myomatous.

If we regard woman's reproductive life as consisting of three decennial periods—from the fifteenth to the forty-fifth year—it will be found that myomata are rarely met with until near the beginning of the third period—thirty-five to forty-five—when 55 per cent. of these tumours first cause noticeable symptoms.

It is thus evident that myomata are most prone to arise during the decline of sexual activity, when child-bearing is comparatively infrequent. Indeed, the great majority of conceptions occur at an age when myomata are very rarely met with. It appears to me that the causes which determine the development of these tumours, are intimately associated with the waning of the reproductive activity; and especially with those phases of this function that are more particularly associated with the uterus.

Catamenial Function.

The menstrual history of myomatous patients shows that, prior to the onset of the disease, they have almost invariably enjoyed excellent health in this respect, being, in fact, far freer from irregularity, pain, and other catamenial derangements than the majority of women.

Of twenty-four patients in my list, twenty-three had been regular from puberty (profuse five, scanty one), one had been

irregular and profuse, and one had been subject to dysmenorrhœa.

With regard to the advent of puberty, it is noteworthy that it sets in considerably earlier than with most women. According to Tilt, the average age for Englishwomen in general is 14·92 years; but in my myomatous patients the average age was 14 years.

The proportion of cases supervening at an age earlier than the normal, is also considerably in excess of the general average. Of twenty-four cases, in one puberty began at eleven years, in six at twelve, in two at thirteen, in five at fourteen, in one at fourteen and a half, in three at fifteen, in three at sixteen, and in three at seventeen years.

These are all indications of vigorous sexual health. In short, it is evident that catamenial derangements of any kind are seldom present, prior to the onset of the myomatous disease; consequently I am unable to accept Paoletti's dictum, that those in whom puberty supervenes tardily are more liable to these tumours than others. Moreover, it follows from the foregoing that menstrual derangements have nothing whatever to do with the causation of myomatous disease.

It accords with this, that these women had, as a rule, enjoyed good health prior to the onset of the disease, only five out of twenty-one patients in my list having previously experienced indifferent health; and in only two cases was there a history of any previous uterine affection.

Civil State, Marriage, Fertility, etc.

It might be expected of women having such a history that an unusually large proportion of them would marry, that they would marry earlier than the average, and that they would be exceedingly prolific; and this would be the natural course of events.

But careful study of the life-history of myomatous patients shows that none of these expectations are fulfilled.

An unduly large proportion of them will be found to have led celibate lives. Thus, of 50 cases in my list, 26 were unmarried; of Gusserow's 959 myomatous patients, the pro-

portion of married to single is as 2·3 to 1, and of Schumacher's 189 patients the ratio is 2 to 1; whereas among English-women in general over twenty-four years of age, the proportion of married to single is as 3·7 to 1.

I have often seen Gusserow's figures quoted as evidence that marriage predisposes to myomatous disease; but such a mistake can only be made by neglecting to take into account the proportion of married to single women of corresponding age in the general population. Yet, such is the careless and misleading way in which statistical data are often employed by gynæcological authors, that this important proviso is generally omitted.

I have found that the average age at which myomatous women marry is 24·9 years, which differs but little from the average for women in general.

The number of children born to myomatous women is much below the average; thus, Duncan and West found that 62 of these women produced only 124 children and 48 miscarriages, and 99 similar patients, tabulated by Winckel, produced between them but 276 children; this gives an average of about 2·5 children to each marriage, whereas in the general community the average is 4·6 children per marriage.

Of Duncan and West's 62 patients, 32 had but a single pregnancy, and of these 10 were premature; but in the general population the amount of one-child sterility amounts only to 1 in 8·5.

The proportion of myomatous women who are sterile (never pregnant) has been estimated at over 30 per cent., whereas among married women of the general population only about 10 per cent. are sterile. Inasmuch as myomata seldom develop until late in sexual life, not much of this sterility can be ascribed to the presence of these tumours in the uterus; although it is obvious that when present, they tend to check conception and to favour the production of miscarriages—by the mechanical obstacles they present, by the uterine deformities and displacements they cause, and by the various other morbid conditions they engender.

The remarkable unproductiveness of myomatous women is

well illustrated by analysis of the results of eighteen such marriages in my list; of these four were sterile, five produced only one or more miscarriages each, and only nine begat living children—of the latter three produced but one child each, the total output being only twenty-six children.

Lastly, it remains for me to mention that, among the married, myomata are of more frequent occurrence in the sterile than in those who bear children.

I think there can be no doubt, as the above facts show, that the suppression of maternity and diminution of the natural fertility, however caused—whether by celibacy, late marriage, artificially induced sterility, etc.—are among the most important factors in the genesis of these tumours. It may be truly said that maternity and child-bearing are the great enemies of myomata. The rationale of this seems to be that the nutrient material, meant for the formation of a new individual, when not thus employed, so stimulates certain elements in the uterine musculature as to cause excessive local proliferations, which eventuate in myomata.

Family History.

It might be expected *à priori*, that myomata would often be hereditary; but, in the works of those who have specially studied the disease, one finds hardly a word on this subject.

The family history was fully recorded in fourteen of my cases, with the following results:

In these families there was a history of non-malignant tumour in three, as follows: (1) Sister of patient's mother died of 'abdominal tumour' (myoma ?); (2) cousin on father's side had an ovarian tumour successfully removed; (3) patient's mother, when twenty-five years old, had a tumour removed from her breast, which never returned (fibro adenoma ?)

In three other families there was a history of cancer: (1) Two of patient's sisters had died of cancer of the uterus; (2) patient's sister had died of cancer of uterus; (3) paternal grandfather had died of 'internal tumour.'

There was a marked history of phthisis in three out of twelve families.

Myomatous patients come of large families, for those in my list averaged 8·1 members each.

Since the above was written, Engeström has investigated this subject in 530 myomatous patients, with the result that 13 of them had one or two sisters similarly affected. Bidder has also reported an instance of uterine myomata in two sisters; and Josso the reciprocal heredity of uterine myomata and prostatic hypertrophy, which is interesting, as the latter affection is nearly always due to the presence of small myomata.

Biological Distribution.

Myomata are said to be unknown among savages; but they are fairly common among the negresses of the United States.

In the animal world such tumours are almost unknown; Virchow, however, cites cases met with in the uterus of such domestic animals as the horse, cow, pig and dog; and an instance of this kind, in a cow, has since been described by Vigezzi; in wild animals a very few examples have also been seen, *e.g.*, multiple myomata in the uterus of a kind of beaver (*Myopotamus coypus*) by Hilgendorf, and in a baboon by Sutton.

CHAPTER XI

THE CLINICAL FEATURES OF MYOMA

It has been well remarked by Thomas Watson, that 'Every case of abdominal tumour forms a separate object of study, and must be judged of by its proper circumstances.' This is specially true of uterine myomata.

The correct diagnosis of these tumours is now of more importance than ever, since the progress of surgical science has rendered operative intervention feasible, in cases which were, until comparatively recently, regarded as altogether outside the domain of practical surgery.

The clinical exploration of myomata comprises: (1) Symptomatology, (2) abdominal examination, (3) examination *per vaginam*, and (4) rectal examination.

It must be remembered, however, that success in diagnosis is largely dependent upon correct appreciation of the ensemble of the case.

Conditions apt to simulate Myoma.

In dealing with patients supposed to be suffering from myoma, it is a matter of the first importance not to mistake a mere pregnancy or other unoperable condition for myomatous disease. Such mistakes are not so very exceptional. Hence, in investigating any abdominal tumour, the first step must always be an endeavour to exclude the possibility of pregnancy. In this connection it is well to bear in mind that all kinds of innocent and malignant intra-abdominal

tumours, whether of the uterus, ovaries, or other parts, may be thus complicated.

Moreover, myomata may be simulated by ectopic as well as by uterine pregnancy; and a certain degree of mammary excitement with discharge of lactescent fluid from the nipples, etc., may be caused by these tumours, as well as by pregnancy. In doubtful cases a little judicious delay will often facilitate the diagnosis.

Other forms of uterine enlargement, such as those due to certain inflammatory conditions, malignant disease, subinvolution, retained menses, hæmatocele, flexions, and other displacements, may also occasionally simulate myomatous disease.

Myomata are, however, more frequently confounded with ovarian tumours, than with any other condition except pregnancy. It is especially the soft, œdematous, impacted, and cystic myomata, that are so difficult to discriminate from ovarian cysts. The not infrequent coexistence of both kinds of tumours should also be borne in mind.

Even such conditions as ascites, hydatids, lipoma of the omentum, and floating kidney, have occasionally been mistaken for myomata.

As a rule, however, myomatous tumours are easily diagnosed.

Symptomatology.

The initial indications of the disease, in forty-five myomatous patients, I have found to be as follows:

Hæmorrhage was the leading initial symptom in fifteen cases, and in nine of these it assumed the form of menorrhagia; in the other six cases the hæmorrhage was intermenstrual, and in four of these it was profuse enough to be called 'flooding.' In five cases the hæmorrhage was associated with abdominal tumour and pain, in two with dysmenorrhœa, in one with marked weakness, and in one with vaginal extrusion of the tumour.

It may be said that increased loss at the catamenial periods, which last longer than usual (menorrhagia), and are painful

(dysmenorrhœa), is one of the earliest indications of myomata in women who have just passed the prime of sexual life. Ovarian tumours seldom cause menorrhagia, and amenorrhœa is the concomitant of pregnancy; but slight irregular hæmorrhages generally occur in the course of ectopic gestation. Myomata, occluding the cervix, may be attended with amenorrhœa and uterine enlargement, owing to hæmatometra, pyometra, etc.; and so they may simulate pregnancy.

Sudden 'flooding' is of much more frequent occurrence with malignant disease than with myoma; and, when associated with the latter disease, flooding is generally due to early miscarriage. The irregular intermenstrual hæmorrhages, exceptionally met with in myomatous patients, may be discriminated from those due to malignant disease and ectopic gestation, by the freedom of the intervals between the attacks from offensive sanious discharge; but with sloughing intra-uterine myomata, in process of extrusion, this kind of discharge is often met with.

Although at first the abnormal bleeding due to myomata is generally confined to the catamenial periods, it subsequently persists in the intervals as well. I have previously referred to the causes of this bleeding. With ovarian tumours, on the other hand, the catamenial discharge is generally scanty.

The hæmorrhages associated with myomata, although often alarming, seldom lead directly to fatal results; a few examples of this catastrophy have, however, been reported by Mathews, Duncan, Winckel, and others. In Duncan's case, the bleeding seems to have come from large venous sinuses at the periphery of the tumour. Winckel's patient, who had just passed the climacteric, had a large tumour which caused frequent metrorrhagia. One day, while reposing after dinner, unusually severe flooding set in, of which she died in a few hours, in spite of somewhat tardy efforts to arrest it, transfusion, etc.

The indirect results of repeated hæmorrhages are often most serious, leading to extreme anæmia and debility; whence fatty degeneration of the heart with cardiac failure, etc. This condition also predisposes to thrombosis and pulmonary embolism.

Abdominal Tumour or swelling is, next to hæmorrhage, the most frequent initial indication of the disease. In fifteen of the cases in my list this was the leading indication. In six of these cases the tumour was associated with menstrual derangements—menorrhagia in three and dysmenorrhœa in three cases; nausea and vomiting in two cases; and in three other of these cases the associated initial symptoms were abdominal pain and frequent micturition, each in one case. The abdominal enlargement caused by uterine tumours of moderate size, is generally confined to the lower part of the abdomen; whereas ovarian cystomata tend to cause more general abdominal enlargement.

Pain was the leading initial symptom in nine of my cases; but, as above mentioned, pain was associated with menorrhagia and tumour in several other cases. In three cases the pain was referred to the region of the abdominal tumour; in three cases to the groin; and to the hip, sacral region, and loin each in one case.

The myomatous uterus is often tender on palpation; and sexual intercourse may be painful, owing to the prevailing congestion.

'Aching,' 'bearing down,' and 'dragging' pains referred to the sacral region, the groins, loins, iliac region, genitalia, hip, and upper part of thigh, are also often experienced. These are worse at the catamenial periods; and with intra-uterine tumours, spasmodic pains due to abnormal uterine contractions, are then often experienced.

Severe pain in myomatous disease—when not due to this cause—generally indicates inflammation of the tumour or inflammatory complications in its vicinity, such as salpingitis, pyosalpinx, localised peritonitis, ovaritis, etc.

Such symptoms as **dysuria, frequent micturition**, and **retention** were noted as initial symptoms in three cases, and **painful defæcation** with **prolapsus ani** was noted in one case.

Leucorrhœa was the leading initial symptom in only two cases. It is commonly stated that a thin colourless discharge is one of the usual initial symptoms of myoma; if so, it is strange that but few of these patients had

noticed anything of the kind. Hydrorrhœa is occasionally met with as a symptom of myomatous disease.

In a single case **enlargement of the veins of the legs**, with œdema of the feet, was the first symptom; and in another case a **miscarriage** marked the onset of the disease.

At a later period—on the average three years and seven months after the supervention of the first symptoms—when these patients sought professional assistance on account of the disease, the leading symptoms were different from those manifested at the onset of the malady.

In the majority, **pain** was now the chief symptom for which relief was sought. In seven cases the pain was chiefly sacral; in three of these there was hypogastric pain as well, in two lumbar pain, and in one dysmenorrhœal pain. In the other five cases the pain was chiefly felt over the abdominal tumour in two, in the iliac region in two; and in one case abdominal pain was associated with constant vomiting.

Difficult, frequent, and painful **micturition** was the determining symptom in no less than eight cases, three of these being associated with difficulty in defæcation, and one with retention of urine.

The large size of the **abdominal tumour**, rather than the urgency of any special symptoms, caused six patients to seek advice; and in four cases extrusion of the tumour *per vaginam* was the determining cause, three being attended with sanious vaginal discharge.

In four cases **œdema of one leg and foot**—generally the left—with venous engorgement, was the chief symptom complained of.

Subacute **intestinal obstruction** was the cause in two cases; **dyspnœa** and **bronchitis** (one with left hydrothorax) in three cases; **calculous pyelitis, purpura**, and **fistula in ano** each in one case.

It is remarkable that very few patients sought professional assistance mainly on account of hæmorrhage, although most of them had suffered more or less from this cause.

Vesical troubles were of much more frequent occurrence

than rectal ones. It is well to recollect that ovarian tumours seldom cause symptoms of this kind. Hæmorrhoidal affections were very rarely complained of.

Obstinate vomiting, when not due to some degree of obstruction of the bowel or to peritonitis, is generally caused by mobile, stalked, subperitoneal tumours of some size in the abdominal cavity.

It is noteworthy that even large myomata may exist for many years, without causing marked symptoms of any kind; and this is especially the case with stalked subperitoneal forms. As a rule, the closer the connection between the tumour and the uterus, the more marked the symptoms; hence even small myomata that project into the uterine cavity, or are embedded in its musculature, may cause serious disturbance of health.

In celebate, weakly, and aged persons, the symptoms of myomata are generally less marked than in the married and the robust.

Abdominal Examination.

The indications given by myomata on abdominal examination depend upon the size of the tumour, the direction of its extension, and its mode of connection with the uterus.

Most of those seeking surgical advice have rather large tumours, which are intimately connected with the uterus. Beyond some median bulging in the hypogastric region or its vicinity, nothing abnormal is noticeable on inspection; but with large tumours the subcutaneous veins may be unduly prominent, and there may even be œdema of the lower part of the abdominal wall.

Such tumours present as firm, non-fluctuating, well-defined masses, more or less median in position, which appear to rise up out of the pelvis. When only a single large tumour presents, it generally feels smooth and rounded; but on careful palpation, even in these cases, some peripheral nodules or bosses can generally be felt. In more than half the cases, instead of a smooth rounded tumour, numerous hard, bossy nodules present, which are characteristic of myomata.

Exceptionally, large myomata present as elastic, or quasi-fluctuating tumours. Although the mobility of these tumours is generally restricted, they can be swayed from side to side; and on bimanual palpation the uterus will be found to move with the tumour.

Such tumours commonly extend upwards as high as the umbilicus, and laterally they reach towards the lumbar and iliac regions, spreading out laterally more below than above. Over this area there is dulness on percussion, the rest of the abdomen and the flanks being resonant. Very large tumours may, however, fill almost the whole abdominal cavity.

On auscultation a vascular souffle, synchronous with the pulse, may be heard in many cases; and these solid tumours, when large, readily transmit the cardiac sounds from the aorta. The former condition may be mistaken by the uninitiated for the uterine souffle of pregnancy, and the latter for the beating of the fœtal heart. In advanced pregnancy, however, uterine contractions and fœtal movements may be felt on abdominal palpation.

For the discrimination of extra-uterine gestation, regard must be had for the special features of this condition.

Stalked subperitoneal myomata of abdominal evolution, when of small size, seldom give rise to any noticeable symptoms; but larger tumours, especially when stalked and cystic, closely simulate ovarian cystomata. Like ovarian tumours, they often occupy a lateral position in the lower part of the abdomen; they may be complicated by hydro-peritoneum, and they seldom cause menorrhagia, metrorrhagia, etc. Such myomata may generally be distinguished from ovarian cystomata by their greater mobility, and by their hardness, for even the cystic forms generally present hard nodules here and there; moreover, it may be possible to demonstrate their continuity with the uterus.

Small myomata projecting within the uterine cavity seldom give rise to clinically appreciable abdominal tumours, although in some cases of this kind there is much uterine hyper-trophy.

Vaginal Examination.

Large myomata of abdominal evolution generally drag the uterus upwards, causing displacement, shortening or obliteration of the portio, and elongation of the vagina. Hence, on vaginal examination, it is often impossible to feel the os; or it may be found high up, just within reach, or otherwise displaced. Ovarian tumours, on the contrary, tend to depress the uterus.

With myomata a large hard—often nodular—circumscribed mass, closely connected with the uterus, is felt, occupying most of the pelvis. Ovarian tumours, on the other hand, are soft, fluctuating, and of undulating contour; and they seldom encroach on the pelvis so much as myomata, hence the mobility of the uterus is seldom much restricted.

By abdomino-vaginal and abdomino-rectal palpation, the continuity or otherwise of the tumour with the uterus may be determined; but even ovarian tumours sometimes become adherent to the uterus, and so may move with it; they, however, seldom cause much uterine hypertrophy. Although the myomatous uterus is generally congested and enlarged, it never acquires the peculiar spongy softness and lubricity of pregnancy. In the latter condition ballottement can be felt; but even this may be simulated by mobile stalked myomata.

Submucous and intraparietal myomata have to be discriminated from early pregnancy, malignant growths, from enlargements caused by displacements and from inflammatory affections. When pregnancy can be excluded, the diagnosis may be facilitated, if necessary, by dilating the cervix, and exploring the interior of the uterus with the finger.

The sound is an instrument that is never really necessary for the diagnosis of uterine tumours; and as its use, even in the most skilled and experienced hands, often entails fatal results, and is otherwise objectionable, it ought never to be employed. More harm than good is certain to result from any infringement of this rule, which applies with nearly equal force to the curette.

Myomata extruding *per vaginam* have several times been

mistaken for the fœtal head, and endeavours have been made to extract them with forceps, etc. Such tumours, however, generally simulate inversion more closely; and when sloughy, they may be mistaken for malignant disease.

Rectal Examination.

Rectal palpation often affords useful information, especially in such cases as the foregoing; and this is the best method for exploring the posterior uterine wall.

For detecting comparatively small myomata, and for discriminating them from other conditions, it is a good plan to seize the portio with forceps and depress the uterus; when, with the index finger in the rectum, it can be thoroughly explored.

Combined recto-abdominal examination is also a useful auxiliary in many cases; and this is often the most effectual means for demonstrating the continuity or otherwise of the tumour with the uterus.

CHAPTER XII

THE RADICAL TREATMENT OF MYOMA

When are Radical Operations Necessary?

An enormous amount of literature has lately been published on the surgical treatment of myomatous tumours; but it appears to me that hardly any of those who have written on this subject have grasped the fundamental factors essential for arriving at a proper conclusion.

Hence large numbers of women have been mutilated to no purpose; and many valuable lives have been unnecessarily sacrificed.

These remarks especially apply to those who have advocated and practised extirpation of the uterus for small myomata, whenever they could be recognised, as a 'conservative' operation, for the prevention of possible ills that might ensue from the subsequent increase of such tumours.

An acquaintance with the natural history of myomata suffices to show that such a remedy is far worse than the disease. We must not forget the old surgical maxim, '*Non nocere.*' Surgeons have been led into a false position in this matter by comparing myomatous with ovarian tumours. There is really no analogy here, but rather complete antithesis.

As I have previously pointed out (Chapter X.), although myomata are exceedingly common, not more than 1 in 2,000 cases ever ends fatally; hence the average duration of life is hardly appreciably affected by the disease; while the number

of those who suffer serious indisposition on this account is wonderfully small, probably not exceeding 1 in 500 cases.

With ovarian cystomata, on the other hand, the tendency is for the majority of unoperated cases to end fatally, the average duration of life having been estimated at only three years; while the morbility is considerable.

If the practice of some surgeons—in removing myomata whenever recognisable—were generally followed, I calculate that nearly a million operations of this kind might be done in a single year. As the average mortality of such operations may be estimated at about 10 per cent., this means that about 100,000 lives would be sacrificed in a single year; whereas, if the disease were left to its natural course—as I have previously shown—no more than 500 lives would be lost.

It will thus be seen that those who advocate and practise these so-called 'conservative' operations incur a grave responsibility.

Not only are uterine myomata infinitely less dangerous to life than ovarian cystomata, but their removal is more hazardous; hence radical treatment is only exceptionally required. In most cases myomata cause no dangerous symptoms; and in many other cases such symptoms as do arise can be relieved by palliative treatment. To justify the removal of these tumours there must, therefore, be some urgent indication.

1. Now, among the conditions likely to necessitate surgical intervention of this kind, pressure symptoms—indicative of dangerous complications, such as retention of urine, intestinal obstruction, peritonitis, dysuria, etc.—take the first rank. These are generally associated with large tumours; but incarcerated myomata of moderate size may cause pressure symptoms of equal severity.

2. Myomata that have become inflamed through septic infection, torsion of the pedicle, or otherwise, especially when in a state of incipient slough or gangrene, must be promptly removed.

3. It is generally desirable to remove all tumours that

project into the vagina, especially such as are extruding, whether complicated by inversion or not.

4. As a rule, all very large tumours incompatible with comfortable existence, especially when their increase is rapid and the patient's health is suffering, should be removed.

5. Myomata complicating pregnancy may require surgical intervention when they cause dystocia, and under some other circumstances.

6. Cystic tumours relatively often require removal, owing to their proneness to inflammatory complications, torsion of the pedicle, etc.

7. Lastly, severe and oft-repeated hæmorrhage, undermining the patient's health, may necessitate operative interference when other treatment has failed. I have placed this indication at the bottom of my list, because I am convinced that the necessity for radical treatment in cases of this kind is most exceptional, although many gynæcologists assert the contrary.

With persons near the climacteric, it is no use putting off a necessary operation, in the expectation that the tumour will subside when the catamenia cease; for, as I have previously pointed out, this is an event that rarely happens.

It is constantly stated by gynæcologists and others, that the question of the early removal of myomata turns largely on the risk of malignant changes subsequently supervening in these tumours. In Chapter IX. I have fully demonstrated the fallacy of this mischievous and unwarrantable statement.

Generalities.

In operating for non-malignant uterine tumours, healthy organs should not be unnecessarily sacrificed, and the ovaries should be preserved when possible.

Two contingencies must specially be provided against, viz., sepsis and hæmorrhage. For the attainment of the best results, the strictest aseptic precautions are absolutely necessary; while for the prevention of hæmorrhage, it is indispensable to have accurate knowledge of the course and relations of the ovarian and uterine bloodvessels (*q.v.* Chapter III.), of

the seats of election for their ligation, compression, etc., and of the special technique relating thereto.

The results of operations for the removal of myomata are, however, largely dependent upon other conditions besides those of technique and operative skill, for the size of the tumour, the complications attending it, and the general condition of the patient, make an immense difference; hence it has been well remarked, that mere percentages of mortality, after such procedures, are not necessarily either a fair test of the skill of the operator or of the correctness of his practice.

The necessity for a radical operation having been decided, the question then arises as to the kind of procedure to be employed. This must depend upon the circumstances of the particular case.

Myomata may be removed either by the vaginal or by the abdominal route; whichever alternative is selected, the severity of the procedure admits of considerable variation; thus, while in some cases only the tumour need be removed (**myomectomy, enucleation,** etc.); in others, together with the tumour, more or less of the uterus may have to be amputated (**hystero-myomectomy**); and, lastly, it may be necessary to extirpate the whole myomatous uterus (**hysterectomy**).

A. The Vaginal Operation.

The removal of myomata that have descended into the vagina is an ancient procedure; indeed, it was practically the only form of surgical treatment in vogue, until Amussat, in 1840, opened up the cervix and removed a myoma from within the corpus uteri.

The vaginal operation is still the least dangerous, and the most successful of all modes of operating in suitable cases; and it is regrettable that its advantages are so generally ignored by British surgeons.

It is the best way of dealing with all tumours accessible *per vaginam*, or that can safely be rendered so.

It must be borne in mind that septic infection of myomata projecting into the uterus and vagina is a most dangerous

complication, which is apt to be caused by any form of traumatism. Consequently, vaginal removal when undertaken, should always be completed. It is a mistake to attempt to imitate the natural process of expulsion by partial operations, by incision of the capsule, by decortication, by gouging or burning the tumour substance, etc.; for, in nineteen out of twenty cases, the natural efforts at elimination end fatally, and the results of the artificial imitation thereof are hardly less disastrous.

For similar reasons ligation and torsion of the pedicle are also to be condemned, as well as the use of the écraseur, the galvano-cautery snare, the curette, parenchymatous injections, and other ancient procedures of this kind; for all these favour septic infection, inflammation, and suppuration, of which many fatal instances might be adduced.

The same objection, in a less degree, applies also to dilatation of the cervix by sponge tents, laminaria, etc., such procedures being specially dangerous when inflammatory conditions of the adnexa and of the pelvic peritoneum are present.

Vaginal Myomectomy, Enucleation, etc., for Accessible Tumours.

The removal of myomata growing into the vagina from the inferior segment of the uterus, and of extruding tumours that have descended from the uterus into the vagina, or have become engaged in the cervical canal, may generally be best effected by enucleation *per vaginam*. This mode of treatment has the great advantage of removing the disease without mutilating the patient.

In the case of easily accessible, pedunculated tumours of no great size, however, these may be removed by dividing the pedicle, close to the tumour, with scissors curved on the flat. By making the section close to the tumour, the uterus will not be injured, even should it be somewhat inverted, as generally happens. If feasible, the pedicle may be previously ligatured, or seized with pressure forceps. These proceedings are much facilitated by traction on the

tumour. A loose tampon of iodoform gauze is afterwards introduced into the vagina, which may be arranged as a hæmostatic plug should this be necessary.

As a rule, however, the class of tumours to which I am now referring have no distinct pedicle. Moreover, they are softer than is usual with most myomata, often being œdematous from congestion or inflammatory changes. Such tumours are generally solitary; or, at any rate, only one has attained considerable size.

Vaginal operations are easier in parous women with roomy vaginæ, than in nulliparæ, and in the aged.

Technique.

In a general way, it may be said that the technique and the instruments required are similar to those employed for vaginal hysterectomy.

The field of operation and its vicinity having been previously disinfected and the bowels evacuated, the patient is anæsthetised and placed in lithotomy position, with Clover's crutch between the knees. The bladder having been emptied, the vagina is irrigated with antiseptic solution. Simon's specula and retractors will be found invaluable for separating the vaginal walls, etc., so as to secure a good view of the parts.

Emmet long ago showed how greatly traction facilitates the removal of these tumours; and by the uterine contractions it excites, hæmorrhage is restrained. An assistant, pressing on the hypogastric region, pushes the uterus downwards; while the surgeon, seizing the tumour with a pair of powerful toothed volsellæ, pulls it down as much as possible, and with a blunt-pointed scissors makes crucial incision into its most accessible part. The severed capsule is now peeled off, a blunt enucleator being used to aid the fingers, if necessary. The part of the tumour thus laid bare is next seized with volsellæ; and, as it is depressed, the capsule is gradually separated right up to its base, when the tumour is shelled out.

In dealing with large tumours, it may be necessary to

remove them piecemeal (morcellement), cutting them up into wedge-shaped or conoid fragments. The presenting part of the tumour having been seized with volsellæ or with Péan's toothed morcellation forceps, its central part is attacked with a long-handled, blunt-pointed scissors, or with a long-handled bistoury. The first fragment having been removed, the edges of the wound are seized with volsellæ and fresh fragments are excised; and so on, until the whole tumour has been extirpated. Bleeding points, which are generally peripheral, are seized with pressure forceps; but these may be removed before the completion of the operation. All but the stump of the capsule is cut away. Lastly, the bed of the tumour and the vagina is lightly plugged with a few long strips of iodoform gauze, which may be removed a few days later.

In drawing down the tumour, the uterus may be more or less inverted. Provided this is duly recognised, and care is taken to avoid wounding the displaced organ (as also the bladder, which is often displaced as well), such an occurrence facilitates the operation. There is no difficulty in correcting the displacement after the removal of the tumour. For the extirpation of tumours embedded in the substance of the lower part of the uterus, the overlying uterine tissues must be incised before proceeding to enucleation.

These extruding tumours are generally in a more or less inflamed, septic, or sloughy condition; and it is to septic complications thus initiated that the chief dangers attending vaginal myomectomy must be ascribed. These comprise pyosalpinx, localised or general peritonitis, septicæmia, etc.; and when these can be recognised, more radical procedures are necessary.

Illustrative Cases.

In a case under my own observation, a patient, aged forty, had an inflamed extruding cervical myoma successfully removed by vaginal myomectomy; but she died a few days afterwards of acute peritonitis, due to an unrecognised pyosalpinx, which ruptured into the peritoneal cavity.

Usually, however, impending septic troubles are cured by the operation, if they have not been allowed to advance too far.

In properly selected cases, the dangers of this proceeding are exceedingly small. Leopold has had a run of forty-six operations without a single fatality, and Chrobak forty-three operations with but one death; while Péan has removed myomata *per vaginam* eighty-three times (including total hysterectomy as well in seventeen), with only two deaths, or 2·4 per cent.

Per contra, if cases of this kind are left to nature, most of them end fatally.

The following illustrative cases by Péan show how effectively these septically infected, extruding tumours, may often be dealt with:

1. A 2-parous, obese woman, aged forty, with symptoms of acute peritonitis and fœtid sanious vaginal discharge. Through the patulous os, a large extruding intra-uterine tumour could be felt, which appeared to be in a state of commencing slough. Antiseptic vaginal irrigation and ergot were prescribed. Shortly afterwards, the os being well dilated, a sphacelated myoma, the size of an adult's head, was removed piecemeal, the tumour being attached to the fundus. The patient's recovery was rapid and complete.

2. The next case was a woman of twenty-five, very weak and exhausted from subacute peritonitis. She was subject to metrorrhagia and fœtid sanious vaginal discharge. There was a large abdominal tumour in the uterine region. A softish mass—the size of the fœtal head—was found engaged in the dilated os. It proved to be a sloughing myoma, which was removed piecemeal, chiefly with the fingers, the patient being anæsthetised. A second tumour, also septically infected, was then felt within the uterus; it was also removed with the fingers. The patient was soon restored to good health.

3. This patient was a married woman, aged twenty, who had a miscarriage two years previously. She had since been subject to metrorrhagia, and during the last few days to violent expulsive uterine pains. A large tumour was felt engaged in the dilated os. There was sanious fœtid discharge with fever. The patient being

anæsthetised, was placed in lithotomy position and—after irrigation of the vagina with antiseptic solution — retractors were introduced; the tumour was then seized by strong volsellæ and removed piecemeal. Its attachment was to the fundus. There was hardly any hæmorrhage. With the exception of slight fever for a few days, the recovery was rapid and uneventful.

Inversion.

Among the conditions requiring operative interference by the vaginal route, mention must be made of inversion of the myomatous uterus. As the history of many cases show, the inverted myomatous uterus is remarkably tolerant of all kinds of operative procedures. This is fortunate; because, for dealing with the condition, tolerably extensive operations are often necessary. Such tumours are, as a rule, easily accessible. Under the erroneous belief, that only an extruding myoma was being dealt with; the inverted myomatous uterus has often been amputated by ligature, elastic band, écraseur, wire snare, knife, scissors, etc., and generally with success. Thus Newnham, having to deal with a large, sloughing myoma, projecting from the vulva, removed it with the wire écraseur. On subsequently examining the specimen, he found that—besides the tumour—he had removed as well, the upper half of the uterus and both Fallopian tubes. By rectal examination such mistakes may be obviated.

Myomatous tumours, complicated by inversion, are often in an inflamed, sloughy, or gangrenous condition; and morbid processes of this kind often spread to the uterus. Under these circumstances, there may also be concomitant pyosalpinx, peritonitis, etc.

In deciding as to the operation to be undertaken in any particular case, these considerations have to be borne in mind.

As a rule, it is best simply to remove uncomplicated tumours; and then to replace the inverted uterus.

In a case reported by Aust Lawrence, the uterus underwent spontaneous reinversion, after removal of the tumour. His patient was a married nullipara, for many years subject to profuse menstruation. Eight months previously, when

lifting a heavy bed, she suddenly 'felt her womb come down.' However, it was not until shortly before Lawrence first saw her, that the tumour protruded from the vulva. This extrusion was attended with pain and alarming hæmorrhage. On examination, a tumour the size of a man's fist was found there. It was connected by a long pedicle with the top of the vagina. Realising that this pedicle was the completely inverted uterus, Lawrence was careful not to interfere with it, in removing the tumour; which he did, by severing the pedicle close to the tumour, after having previously ligatured it. Next day, the uterus was found to have undergone spontaneous reinversion; and the patient was soon restored to health.

Frazer Nash, Herman, Dow, and others, have successfully replaced the inverted organ, after enucleation of the offending tumour; a procedure that had often been employed by Emmet many years previously.

Even cases of very long standing may be successfully treated in this way. Thus, Watts has met with an instance, in which an inversion of thirteen years' duration, was successfully reduced after removal of the extruded tumour.

In dealing with inflamed, sloughy, and gangrenous myomata, mere removal of the tumour is insufficient; when the superimposed morbid condition, has invaded the uterus as well. In such cases, it is necessary to extirpate more or less of the inverted uterus, together with the tumour; and when the adnexa are septically infected, these also must be removed.

Herman has reported an instance showing the insufficiency of mere myomectomy in such cases.

His patient was a two-para, aged thirty-eight, with a sloughy tumour—the size of the fist—projecting from the vulva. On examination, this proved to be the inverted uterus, with a gangrenous myoma attached to its fundus. The tumour was scraped away piecemeal; and an unsuccessful attempt was made to reduce the inverted organ. The patient died on the next day. At the necropsy, it was found that the gangrenous inflammation had spread from the tumour to the fundus uteri, which was partially destroyed thereby.

Had a considerable part of the affected uterus been

amputated, together with the tumour, the patient would probably have recovered, as in the three following cases:

1. Madame X., aged fifty-six, had been subject to profuse metrorrhagia for several years. Her medical attendants, finding a big intra-uterine myoma dilating the os, seized it with forceps, and endeavoured to draw it into the vagina. In so doing, the tumour suddenly shot out from the vulva, carrying the inverted fundus uteri with it. Péan, who was called in at this juncture, clamped the inverted organ with two long curved pressure forceps (Fig. 28); and with a bistoury cut away the tumour with the inverted fundus. The margins of the severed uterine walls were then united with catgut sutures, and the stump was reduced without any difficulty. The patient made an excellent recovery.

2. Horrocks has reported a similar case, with an equally satisfactory result; although the patient—a multipara aged forty-five—was very weak and anæmic.

3. Gottschalk's patient was an emaciated virgin of sixty-three, in whom the menopause supervened at fifty. She had been subject to metrorrhagia for the last three years, and a tumour had then appeared at the vulva. She had anasarca and dyspnœa, from cardiac and renal disease. A tumour—the size of the fist—projected from the vulva, which was the prolapsed and inverted myomatous uterus. A diverticulum from the bladder was comprised in the prolapsed mass. Numerous small myomata were present in the obtruded vaginal wall. These were enucleated. An elastic band was then placed round the protruding uterine mass, the uterine ligaments were ligatured; and the corpus uteri was amputated together with the myomatous fundus. There was an uneventful recovery; but the patient died five months later, from cardiac and renal disease.

In Vanderlinden's case, the inverted uterus was amputated before the true condition was recognised.

The patient was an unmarried woman, aged forty-two, who had suffered for some time from undue losses of blood and urinary troubles. On examination the vagina was found to be distended by a tumour, the size of a child's head, which caused marked protrusion of the hymen. In the process of its removal by morcellement, a pedicle was reached. When this had been cut through, it was seen to be hollow; and it was evidently the

inverted uterus, as the peritoneum had been opened. The whole uterus was then extirpated, every part of it being affected with myomata, except the cervix. Convalescence was delayed by rather severe septic symptoms, but eventually the patient recovered.

As an instance of inversion due to the presence of a small, sessile, gangrenous myoma in the fundus, Oliver's case may be cited:

The patient was a multiparous widow, aged fifty-eight, who had suffered from metrorrhagia for three months, and from prolapse, with offensive discharge, for a fortnight. The inverted organ protruded from the vulva as a sloughy mass. It was completely extirpated, the ovaries being left. The patient soon recovered without a single bad symptom.

The removal of tumours, such as the foregoing, by the abdominal route (supravaginal amputation, etc.), as practised by Gottschalk and some others, appears to me, in view of the excellent results attained by modern developments of the vaginal operation, to be hardly ever justifiable.

Vaginal Myomectomy, etc., for Inaccessible Intra-uterine Tumours.

For the removal of tumours contained wholly within the uterine cavity, which are inaccessible from the vagina, resort must be had to some modification of Amussat's proceeding; or to laparotomy. The former *modus operandi* is well adapted for dealing with tumours that fall short of the largest dimensions; while the latter is reserved for tumours too big for removal *per vaginam*.

In such cases the first step is to render the tumour accessible. I have previously referred to the dangers attending dilatation of the cervix with sponge tents, laminaria, etc., and rapid dilatation with Hegar's instruments is almost equally objectionable; while none of these methods give sufficient room for dealing satisfactorily with any but the smallest tumours.

This object is best effected by separating the bladder from the cervix; and then dividing the anterior uterine wall by median longitudinal incision (*hemisectio uteri mediana*), until the tumour is sufficiently exposed.

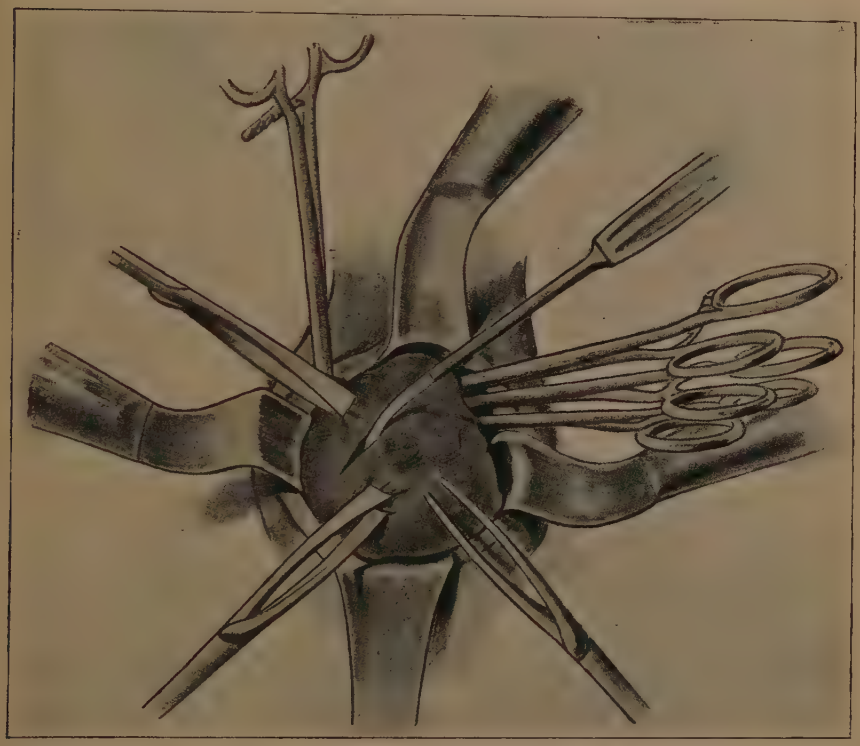

FIG. 30.—AN INTRA-UTERINE MYOMA THAT HAS BEEN RENDERED ACCESSIBLE BY SPLITTING THE CERVIX, AND IS NOW READY FOR MORCELLEMENT. (LANDAU.)

The tumour is held in position by three volsellæ, and the vaginal walls are separated by retractors. Three pressure forceps have been applied to the left broad ligament, and a fourth is shown on the right side. An incision is about to be made into the tumour with a long-handled bistoury.

The steps of the operation, the technique, and the instruments required, are similar to those in vogue for the early stages of vaginal hysterectomy.

The patient being in lithotomy position, the portio is

seized with a pair of volsellæ, and drawn downwards; an ovoid incision is then made round the portio, and anteriorly the paracervical tissues are separated from the bladder. If necessary, the pararectal tissues may be similarly opened up. The detached bladder is then drawn upwards with a retractor, well out of the way. The cervical canal is next laid open with blunt-pointed scissors. On each of the severed segments of the cervical wall, a fresh volsella is at once placed; and, if necessary, the process is repeated until the tumour is sufficiently exposed. It is seldom necessary to extend the incision as far as the fundus uteri. The pressure and traction exerted by the volsellæ suffices to check any serious hæmorrhage. Should any difficulty arise from this source, one or both broad ligaments may be clamped by pressure forceps at the lateral fornix (Fig. 30), or ligatures may be passed and tied.

The surface of the tumour, being well in view, is drawn down with volsellæ, and a deep incision is made into it with a long-handled scissors or bistoury (Fig. 30). Each lip is then grasped with a volsella or morcellation forceps, and all that it holds is cut away. By repetition of this process the tumour is soon reduced in size, so that the rest can be enucleated; or the whole tumour may be removed piecemeal, the operator taking care to keep within the capsule. The operation is concluded by lightly packing the bed of the tumour with a long strip of iodoform gauze; and uniting the severed cervical walls by a few sutures.

In cases of this kind Péan usually excises the cervix, and divides the uterus bilaterally. The gravity of such procedures depends chiefly upon the size and condition of the tumour to be removed (septic infection, gangrene, etc.); and upon the complications, *e.g.*, pyosalpinx, peritonitis, septicæmia, etc.

Péan has extirpated very large tumours — such as are usually dealt with by laparotomy—in this way, with three deaths in forty operations.

The chief dangers to be guarded against are injuries to adjacent structures, such as the bladder and ureters, and hæmorrhage.

The former may be avoided, by completely freeing the bladder and ureters from the uterus; and carefully guarding them with the long-bladed retractor, before beginning the myomectomy proper.

The latter may be prevented by so applying the volsellæ as to exert traction, and to prevent the severed stump retracting. In the paracervical dissection, care should be taken to avoid injuring the vessels at the base of the broad ligaments, to which preventive clamps may be applied if necessary.

Vaginal Hysterectomy.

In the evolution of this operation the end in view—until quite recently—has always been extirpation of the cancerous uterus.

Hennig (1875), Czerny (1879), Schroeder and Martin have especially elaborated the technique to this end; but, in the early part of the century, the operation had been done by Osiander, Sauter, Récamier, Blundell, Langenbeck and others. Even in the sixteenth century the cancerous uterus had been thus extirpated; and, according to Mickulicz, an operation of this kind had been planned by Soranus in the first century.

Péan (1885) was one of the earliest to adapt the operation to the extirpation of myomatous disease. To him we owe the systematic employment of forcipressure for preventive hæmostasis, instead of the ligature, which his German predecessors had employed. The principle of morcellement, and the extension of the operation for the removal of the adnexa, we also owe to Péan; who must be regarded as the father of this branch of vaginal surgery, although some of the methods now in vogue differ considerably from his.

It was an essential feature of Péan's operation to secure the bloodvessels with his clamps, before proceeding to the removal of the uterus or the tumours; and in morcellation each fragment to be removed required its own hæmostatic forceps. The great number of forceps thus necessitated, blocked the field of operation; and rendered the necessary

manipulations difficult. To obviate this, Doyen (1892) and Landau (1895) introduced a mode of operating in which special primary hæmostasis is done away with—the structures involved being first liberated and brought down into the vagina to form a pedicle—hæmostasis being effected just before excision at the end of the operation. This method is specially adapted for dealing with the myomatous uterus; although it must be admitted that there are certain exceptional cases, which can only be dealt with safely by Péan's plan.

Indications for the Operation.

Vaginal hysterectomy, with or without morcellation, for myomatous disease, may be required under the following circumstances:

1. For the removal of sloughing, gangrenous, and septically-infected tumours, in which the septic process has spread to the uterine wall.

2. Multiple myomata, forming altogether a mass of considerable size, may generally be best removed in this way, when their extirpation is necessary.

3. The removal of tumours complicated with pyosalpinx, hæmatosalpinx, pyometra, ectopic gestation, peritonitis, pelvic or ovarian abscess, ovarian cystoma, etc., as a rule, also belong to this category.

4. In the event of failure to complete a myomectomy, vaginal hysterectomy may be necessary for the removal of the tumour.

Instruments.

Vaginal hysterectomy with morcellation, requires rather a formidable armamentarium; although, for ordinary cases, many of the instruments provided need not be used. These comprise:

1. *Specula and Retractors.*—Modifications of Simon's univalve instruments are usually employed. Péan's specula are shown in Fig. 31.

The blade of the anterior instrument should be longer and

narrower than the posterior one; and it is well to have two varieties, one being longer in the blade than the other. This instrument is used, not only as a speculum and retractor; but also as a protector of the bladder and ureters during the course of the operation.

2. *Volsellæ.*—These are used for fixation, traction, and hæmostatic purposes. The teeth, of which there should be from four to six to each claw, should be set at right angles;

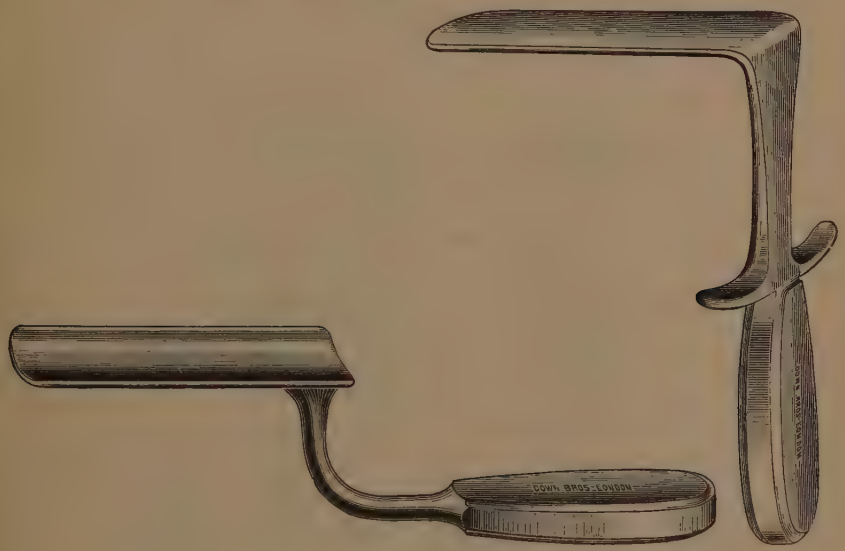

FIG. 31.—PÉAN'S SPECULA FOR VAGINAL HYSTERECTOMY.
The one to the left is for the anterior vaginal wall, and the one to the right for the posterior wall.

and the handle must be furnished with a rack fastening. About a dozen should be provided, mostly of the four-toothed variety (Fig. 32).

3. *Fenestrated Forceps.*—These are used for grasping portions of myomatous tumours. Some should be with, and others without, sharp teeth. Péan's instruments are shown in Fig. 33.

Nélaton's and Segond's fenestrated cyst forceps are also used for the same purpose.

FIG. 32.—THE FOUR-TOOTHED VOLSELLA, AS USED BY LANDAU, POZZI, AND OTHERS.

FIG. 33.—FENESTRATED MORCELLATION FORCEPS, ONE WITH, AND THE OTHER WITHOUT, SHARP TEETH. (PÉAN.)

FIG. 34.—FENESTRATED FORCEPS FOR THE ADNEXA, ETC.

Of the toothless fenestrated forceps, Doyen employs a modification of Collin's tongue forceps, with rack handle fastening (Fig. 34). They clasp with a broad surface, do not

FIG. 35.—LONG-JAWED PRESSURE FORCEPS—STRAIGHT AND CURVED. (PÉAN.)

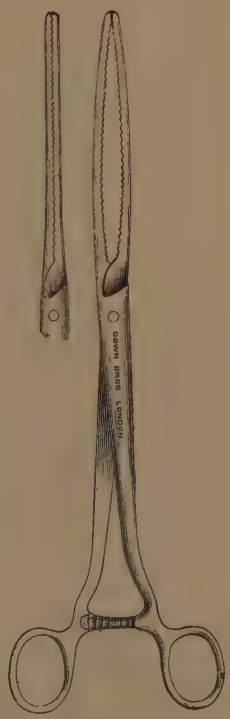

FIG. 36.—DOYEN'S BROAD LIGAMENT CLAMP.

lacerate, and are especially useful in delivering the adnexa, etc.

4. *Pressure Forceps.*—It is desirable to have about two dozen of these, of various shapes and sizes, and of different length in the jaws.

Péan's forceps for clamping the broad ligaments are shown in Fig. 35. Doyen employs a lighter but equally long-jawed forceps, with a bowed clamping surface, capable of including the whole breadth of the broad ligament (Fig. 36). Most operators, however, prefer to use two or three shorter-jawed forceps to each broad ligament, placed one above another, rather than trust to a single clamp (Fig. 37).

FIG. 37.—PÉAN'S SHORT-JAWED PRESSURE FORCEPS.

5. *Scissors.*—One strong, straight, blunt-pointed pair, and another of similar make, but curved on the flat; a straight, long-handled, blunt-pointed vaginal scissors, and a similar pair curved on the flat.

6. *Scalpels, etc.*—A straight scalpel for incision of the portio, if this be not done with scissors; two long-handled bistouries for morcellation, one straight, the other curved on the flat.

7. *Other Instruments required.*—Female catheter; long blunt-ended director, for aiding the finger in opening up the paracervical tissues, and for use as an enucleator; also a blunt-pointed, long-handled pedicle needle, for ligaturing the broad ligaments should this be necessary.

Technique.

At a convenient time before the operation, the rectum and bladder should be evacuated, the former by the administration of a warm water and soap enema.

The vagina and external genitalia should also be subjected to preliminary disinfection.

Many surgeons keep up irrigation of the vagina with antiseptic solution, during the whole operation; but as this encroaches on the limited space at the disposal of the operator, involves an extra assistant, and has been proved by experience to be unnecessary, it should be dispensed with. In the event, however, of irrigation being employed during the course of the operation; care must be taken to use none but unirritating solutions, such as boiled water or sterilised saline solution, after the peritoneum has been opened.

Fatal cases of mercurial poisoning have resulted from irrigation with mercurial solutions, which should not be employed for this purpose.

The patient, having been anæsthetised, is placed in the exaggerated lithotomy position, the buttocks projecting over the margin of the operating-table, which should be suitably arranged for drainage, etc. (Fig. 38). The surgeon stands or sits facing the field of operation.

When the patient's thighs and lower limbs are maintained in position by means of supports connected with the operation-table (Edebohl's position), only one assistant will be required, which is often a great desideratum. With Clover's crutch two are necessary, who stand facing the operator, one on each side. Each assistant steadies the patient's flexed thigh with one arm; and with the other, assists the surgeon by retracting the vaginal walls, and exposing the field of operation as required. The operating-room should be moderately warm; and parts of the body not needing to be exposed, should be wrapped up to prevent chill.

The steps of the operation are as follows:

1. **Exposure and Fixation of the Portio**—The fourchette and posterior vaginal wall are depressed with a short, broad, flattened, univalve speculum; and, if necessary, the anterior

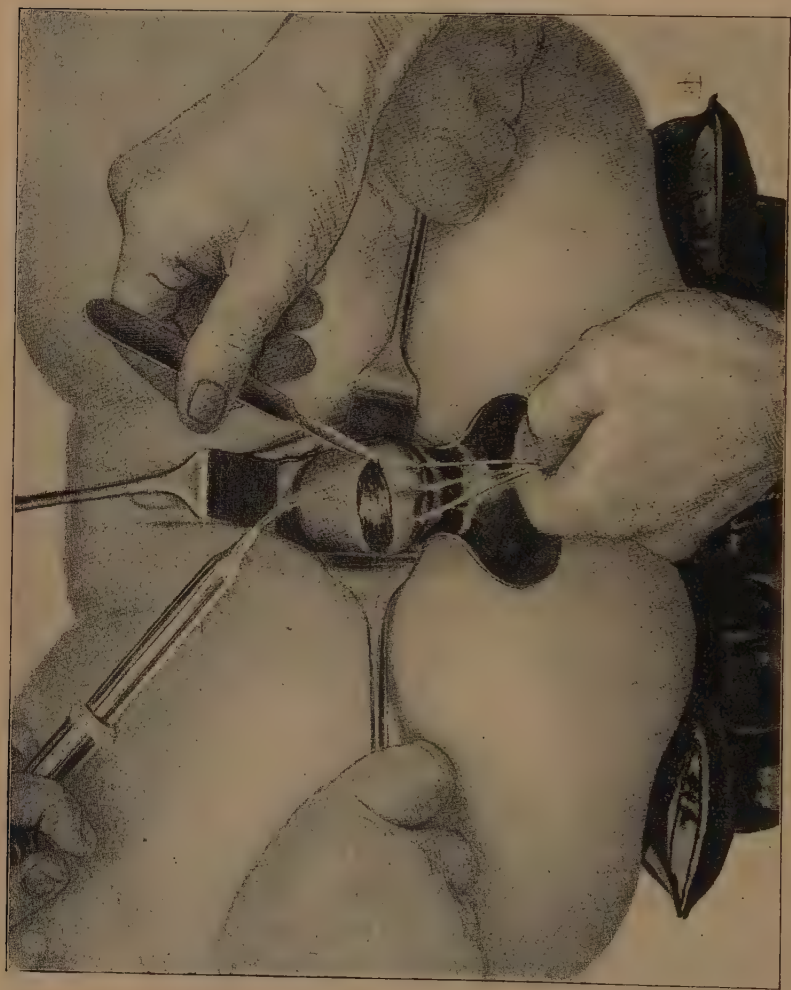

FIG. 38.—VAGINAL HYSTERECTOMY: BEGINNING THE OPERATION BY CIRCULAR INCISION OF THE PORTIO. (KELLY.)

The position of the patient, the vaginal specula (anterior and posterior), and retractors, are shown, as well as the hands of the surgeon and his chief assistants.

and lateral vaginal walls are held aside with retractors (Fig. 38). Each commissure of the os is then seized with a four-toothed volsella; and the portio is drawn downwards and backwards, exposing the anterior vaginal cul-de-sac. Some surgeons transfix the portio with stout silk threads, and use these as tractors (Fig. 38).

2. **Circular Incision of the Portio.**—For this purpose either a blunt-pointed scissors, or a long-handled bistoury is employed. The incision is made through the lining membrane of the portio, at about half an inch external to the os, and it should penetrate to the underlying muscular tissue (Fig. 38).

3. **Separation of the Paracervical Tissues.**—A catheter in the bladder serves to indicate the position of this organ during the process of *décollement*. The separation is effected with the finger, the blunt end of a long director, or with blunt-pointed scissors. Laterally, the separation is pushed fairly far outwards, to free the edges of the broad ligaments. Danger of wounding the ureters, in separating the bladder, is avoided by keeping well on to the uterine musculature.

4. **Opening of the Anterior Peritoneal Pouch.**—Before this is done, the freed bladder with the ureters attached, is elevated and protected by a long-bladed speculum (Figs. 31 and 38). The peritoneum is then carefully seized with a dressing forceps, and opened with blunt-pointed scissors.

5. **Luxation of the Uterus and Adnexa into the Vagina, etc.**—Through the opening thus made, the uterus is seized close to the fundus—with a powerful volsella—is anteflexed; and drawn down into the vagina. When the tumours form a large mass, to effect this it may be necessary to open the uterus in the middle line anteriorly; and to resort to morcellation. Douglas' pouch is next divided. The displaced uterus, etc., is now held only by the broad ligaments on each side. The adnexa are secured with ovarian forceps, and any remaining adhesions are separated. Any tendency of the intestines to prolapse at this stage, may be prevented by elevating the pelvis.

6. **Hæmostasis and Excision.**—With the parts thus ex-

posed, the broad ligaments and the uterine bloodvessels are clamped on each side, one or more pressure forceps being employed, so as to grasp the whole thickness of each ligament. The connecting tissues are then severed, internal to the clamps, and the diseased structures are removed.

The broad ligament clamps are left on, and any additional oozing points are secured with pressure forceps.

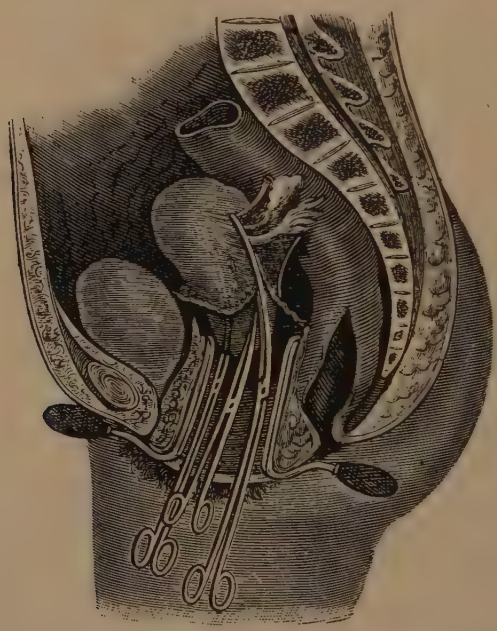

FIG. 39.—PREVENTIVE HÆMOSTASIS FOR VAGINAL HYSTERECTOMY. (PÉAN.)

Showing dissection of the cervix, the opened peritoneal cul-de-sacs, and preventive clamping of the broad ligaments with pressure forceps.

I have previously referred to Péan's method of preventive hæmostasis, and pointed out how it differs in principle from the method just described. This is further illustrated by Fig. 39, which shows the positions in which the clamps should be applied.

On the cessation of hæmorrhage, the wound cavity is lightly sponged out, and any clots there are removed.

A single long strip of sterilised iodoform gauze is then

loosely introduced, with dressing forceps, into the space between the clamps, extending beyond their free ends; and its lower end is knotted, so that it may readily be recognised from any other strips of gauze, that it may be necessary subsequently to introduce, to prevent the forceps from chafing adjacent parts.

No attempt should be made to close the vaginal or peritoneal wounds.

It is well to pass the catheter before completing the toilet of the wound; and should any perforation of the bladder be revealed, it should be at once closed with sutures.

The patient is afterwards laid on her back, with the thighs abducted, the knees semiflexed and supported by pillows.

The clamps are wrapped in a sterilised napkin, and are then supported on a large cushion of wood wool, or other absorbent aseptic material, which is placed beneath the nates.

Catheterism need not be again resorted to, unless for the relief of retention.

The clamps may be removed and the gauze dressing changed, on the third day after the operation.

For the convenience of those who prefer to secure the broad ligaments by ligature, rather than by clamps, it may be mentioned that this is effected as follows:

The paracervical tissues having been freely separated all round, especially at the lateral fornices, and the anterior and posterior peritoneal cul-de-sacs having been opened, the cervix is drawn strongly to one side; into the lateral wound thus exposed, the index finger is passed rather deeply, just external to the cervix, its point being made to project so as to push forwards the lower part of the broad ligament which contains the uterine bloodvessels. A long-handled, blunt-pointed pedicle needle, carrying a stout, sterilised, silk ligature, is then passed deeply into the wound, being guided by the index finger, until it emerges at a short distance from its point of entry. The thread thus embracing the uterine bloodvessels is then firmly tied; and if necessary one or more additional ligatures of this kind may be applied higher

up. A similar procedure is carried out on the opposite side.

The uterus is then freed by severing the broad ligaments with the scissors, on the uterine side of each set of ligatures.

Vaginal hysterectomy for myomatous disease is not a dangerous operation, for of 100 cases lately done by Bushbeck there were only three deaths; and of another 100 cases by Leopold only four died.

Of Bushbeck's operated patients, sixty-five were known to be alive and in good health, at periods varying from one to three years after operation.

The chief dangers arise from septic complications—peritonitis, septicæmia, pyæmia, etc. The removal of large tumours entails the risk of shock.

B. The Abdominal Operation.

The earliest abdominal operations for the removal of myomata, were done through errors of diagnosis, by the pioneers in ovariotomy. Even as early as 1825, Lizars, on opening the abdomen for a supposed ovarian tumour, found that he had to deal with a large uterine myoma; and in the following year Diffenbach had a similar experience. In 1827 Granville did what was thought to be the first ovariotomy in London; but, on subsequent examination, the tumour turned out to be a pedunculated uterine myoma. The like experience befell Clay in 1843.

Burnham and Kimball successfully amputated the myomatous uterus by the supravaginal method in 1853, and Clay performed a similar operation in 1863; while soon afterwards Kœberlé systematised this procedure, especially perfecting the extraperitoneal treatment of the pedicle.

In 1844 Clay completely extirpated the myomatous uterus, under the belief that he was removing an ovarian tumour; and Bardenheuer (1881) was the first who systematised this operation, which Martin, Doyen, and others have since perfected.

Of late, operations such as these have become increasingly

frequent; and I think there can be no doubt, as I have previously mentioned, that the pendulum has now swung too far in this direction.

The removal of myomata by abdominal section, ought to be regarded as a means for dealing with certain exceptional cases, rather than as the routine operative treatment for such tumours.

(1) Most myomata of the largest size may be included in this category; (2) as well as subperitoneal tumours needing operation, especially such as are inflamed and cystic; (3) interstitial tumours of abdominal evolution, especially when multiple and of considerable size; (4) intraligamentous myomata; (5) and lastly, in certain very exceptional cases, abdominal section may be necessary to complete an operation commenced *per vaginam.*

The abdominal operation comprises: (1) Simple removal of the tumour—**myomectomy** or **enucleation**; (2) removal of the tumour together with more or less of the corpus uteri—**hystero-myomectomy, supra-vaginal amputation**, etc.; (3) removal of the whole myomatous uterus—**hysterectomy.**

To open the abdomen, a median incision is made through the abdominal wall below the umbilicus. As the bladder is often unduly elevated in these cases, its lower extremity should be well above the pubes; and the peritoneal sac should be first opened at its upper extremity. Should there be adhesions between the tumour, great omentum, intestines, parietal peritoneum, etc., these must be cautiously separated. If the union be too firm for this, omental adhesions are best overcome by excising the adherent portion of the omentum; while old intestinal and parietal adhesions, may be dealt with by excising the peritoneum covering the adherent part of the tumour. Trendelenburg's position (pelvic elevation) greatly facilitates all operations of this kind, favouring the displacement of the intestines from the pelvis, etc.

Myomectomy.

As the desirability of sparing the reproductive organs whenever possible becomes more generally recognised, the

superiority of conservative procedures, like myomectomy and enucleation, over operations involving partial or complete extirpation of the uterus, will become apparent, especially for comparatively young women, who have been known to bear children after these operations.

Pedunculated myomata may be removed just as if they were ovarian tumours, by transfixing the pedicle with a blunt handled needle carrying a double silk thread; each half is then tied separately, and the threads are cut short. The pedicle is subsequently divided on the distal side of the ligature, and dropped. Some surgeons tie the pedicle *en masse*, besides transfixing and ligating each half, as above described. The vascularisation of the pedicle in subperitoneal myomata is very variable; and it is generally inversely proportional to the extent of the adhesions between the tumour and adjacent structures.

In the very rare event of severe hæmorrhage ensuing from the divided pedicle, this may be temporarily arrested by constricting the lower part of the uterus with an elastic ligature; and permanent hæmostasis may be insured, even in the most troublesome cases, by ligaturing and dividing the ovarian and uterine bloodvessels in each broad ligament.

Before finally dropping the pedicle into the peritoneal cavity, care should be taken to unite the severed peritoneal margins over the raw surface, with a continuous suture of fine catgut.

The mortality of such operations ought not to exceed 3 or 4 per cent. Large tumours and local complications are the chief sources of danger. Leopold has done twenty-one operations of this kind without a single fatality.

Enucleation.

Abdominal enucleation is the best means for removing sessile subperitoneal tumours; intraparietal tumours of abdominal evolution, especially such as grow from the fundus and the anterior surface of the uterus; and many intraligamentous myomata.

Schröder and Martin have especially identified themselves with the development of this operation.

To obtain the best results from enucleation, it is necessary to perfect the arrangements for insuring asepsis, hæmostasis, and retroperitoneal treatment of the uterine wound.

With regard to hæmostasis, it may be mentioned that all hæmorrhage can be prevented, even in the most difficult cases, by preliminary ligation and division of the ovarian and uterine bloodvessels on both sides. To effect this, ligatures should be applied in the three following situations:

1. At the pelvic margin—external to the ovary—near the infundibular pelvic ligament, where the main trunks of the ovarian vessels are secured.

2. Near the uterine attachment of the round ligament, where the ovarian and uterine arteries anastomose.

3. At the lateral margin of the cervix uteri, where the main uterine vessels are found.

It is, however, rarely necessary to resort to such radical procedures in their entirety; nor is it desirable to do so, except in case of necessity. As a rule, a constricting india-rubber or hemp cord, temporarily fixed round the uterus below the tumour, suffices to prevent hæmorrhage during the operation. In certain cases, however, it is necessary for the prevention or arrest of hæmorrhage, to ligature the ovarian vessels at the pelvic margin, and at the attachment of the round ligament; and there are cases in which this must be done—and the upper part of the broad ligament be divided—before a temporary constricting cord can be applied to the uterus, below the tumours to be removed.

It is well to remember, as Winckel, Kuhn, and Olshausen have pointed out; that aseptic rubber bands of this kind, may be left permanently *in situ*, and enclosed in the peritoneum, without any ill results ensuing. Of course, it is only in certain exceptional emergencies, that it would be necessary to adopt such a proceeding.

In some cases temporary clamping of the broad ligaments may be successfully resorted to; and emergencies occur in which digital compression, properly applied, may be useful.

The steps of the operation comprise the exploration and exposure of the tumour through the abdominal incision; the separation of adhesions; and the delivery of the tumour through the wound, if possible.

Next, the field of operation is isolated from the rest of the abdomen by packing aseptic sponges or sterilised gauze compresses, wrung out in hot sterilised water, round the uterus. This and other steps of the operation, are much facilitated by the Trendelenburg position. Enucleation is commenced, by making a longitudinal incision into the projecting part of the tumour to be removed, so as to divide its capsule. The tumour is then seized with one or more volsellæ; and shelled out with the fingers, aided, if necessary, by a blunt enucleator. Several tumours may be thus enucleated in succession. Endeavours should be made to simplify the technique of these operations as much as possible; the fewer assistants and the smaller the number of instruments, etc., employed, the better.

The removal of tumours of large size, whose base is considerably embedded in hypertrophied uterine tissues, may often be best effected by amputation, flaps being cut from the enveloping tissues, by oval incisions made not far from its base. This is facilitated by grasping the tumour with volsellæ, and so keeping up traction (Fig. 40). If necessary, such tumours may be cut up and removed piecemeal.

Redundant tissue about the bed of the enucleated tumour is cut away; and the cavity is closed uniformly throughout, by one or more rows of superimposed buried catgut sutures, which are tied tightly.

Over these the severed peritoneum is drawn, and its infolded serous margins are united by a row of Lembert's sutures.

The elastic constrictor is then removed, and any bleeding points are secured. The toilet of the peritoneum is performed. Lastly, the stump is examined; and when satisfactory hæmostasis has been secured it is dropped into the pelvis, and the operation is completed as in ovariotomy.

In the highly exceptional event of intractable oozing

taking place from the sutured uterine wound, the bed of the tumour may be opened up and plugged with a long strip of iodoform gauze. The margins of the latter are then sutured to the parietal peritoneum at the lower part of the abdominal incision, on each side, the free end of the gauze tampon being brought out at its lower angle. The rest of the abdominal wound is then closed in the usual way. To make assurance doubly sure, Alexander anchors the fundus uteri to the

FIG. 40.—ENUCLEATION OF A LARGE MYOMA, BY CUTTING FLAPS FROM ITS BASE. (KELLY.)

abdominal wound with silkworm-gut sutures, passed through the entire thickness of the latter, and tied externally.

Should the uterine cavity be opened, as frequently happens in dealing with large tumours, it may be closed with a continuous catgut suture, over which other rows of buried sutures are placed.

Zweifel's results show that there is no scientific basis for the prejudice against opening the uterine cavity, on account of the supposed risk of septic infection; and his experience

agrees with the results of bacteriological research, which have repeatedly demonstrated the absence of pathogenic microbes from the healthy uterus. Moreover, Wyder could never detect microbes in the hyperplastic mucosa of uteri extirpated for myomatous disease.

When the cavity of the uterus has been opened, some surgeons pack the bed of the tumour with a strip of iodoform gauze, the free end of which is passed into the vagina; but such a procedure is seldom requisite.

The ovaries and adnexa should not be removed, unless they are so extensively diseased as to render their extirpation necessary; and partial resection of diseased parts is, in general, to be preferred to their total ablation.

Of 141 such operations by Martin, 26 died, or 18·4 per cent.; but this includes all his early operations, before the technique had been perfected. Of his last 20 cases, only 1 was lost. Engström has done 100 operations, with only 5 deaths; but in more than half his cases the tumours removed were not large, and it must be remembered that the largest tumours are the most hazardous to remove by enucleation, as by other means. Lémoin has had 97 abdominal enucleations, with 6 deaths; and Péan's mortality was about 10 per cent. Peritonitis, septicæmia, shock, and hæmorrhage are the chief causes of death, the two former being much more prevalent than the latter. Of Martin's cases, there was recrudescence of the disease in 3 per cent. of those who recovered; and of the latter two subsequently became pregnant.

Hystero-myomectomy (Supravaginal Amputation, etc.).

With regard to the remaining operations practised for the removal of myomata, hystero-myomectomy, especially with intraperitoneal treatment of the stump, is preferable to panhysterectomy, and generally speaking the latter is preferable to panhysterectomy by the 'combined method'; but the truth is, the more the field of these mutilating proceedings is contracted, the better.

It is high time that hysterectomy for myomatous disease were limited to its legitimate sphere—the last resort for

dealing with tumours not otherwise operable. This comprises most tumours of the largest size, whether single or multiple, especially such as are of intraligamentous development, and impacted.

The Intraperitoneal Operation.

To Schröder (1883) belongs the credit of having first systematised this procedure; and it has since been perfected by Zweifel (1894), Kelly (1896), and others.

Special attention must be given to hæmostasis; and to arrangements for covering the stump with peritoneum. The *modus operandi* is as follows:

The patient being in Trendelenburg's position, the abdomen is opened, adhesions are separated, and the tumour is delivered through the wound, when it is surrounded by aseptic sponges or their equivalent.

The next step comprises, ligation and division of both broad ligaments and their included bloodvessels. This often has to be partially effected, before the tumour can be delivered and adhesions separated. The ligatures are applied at the pelvic margin (infundibular pelvic ligament); and then at the insertion of the round ligament. The uterine segment of the broad ligament, thus controlled, is clamped with pressure forceps to prevent reflux hæmorrhage; and the tissues between the ligatures and clamp are severed.

The uterine bloodvessels now have to be secured. To effect this, the peritoneum covering the anterior aspect of the tumour and uterus is divided transversely, from the severed insertion of one round ligament to the other. The serosa is then peeled off the front and back of the tumour; which is seized and rolled over to the opposite side, exposing the uterine bloodvessels. The cervix is located with the finger; and, with a blunt handled needle, a silk thread is passed, so as to secure the uterine vessels at the lateral margin of the cervix, where they turn upwards along the uterine wall. In passing the ligature, the needle should establish contact with the lateral wall of the cervix, and the threads are tightly tied. When similar steps have been

carried out on the opposite side, the tumour, together with the corpus uteri, is freed by dividing the cervix at about the level of the internal os; the section being effected in such a manner as to leave readily adjustable wedge-shaped flaps, which are subsequently sutured together. Some surgeons still transfix the cervix, and tie it in sections, prior to severance; but this is hardly ever necessary.

When the tumour is markedly one-sided or intraligamentous in its development, there is often difficulty in getting at the bloodvessels on the involved side; in such cases, their ligation, the division of the cervix, and the final removal of the tumour, may be best effected by Kelly's method of 'continuous incision from left to right, or from right to left.' On the easy side, ligation is done as above described; and the ovarian vessels on the involved side may also generally be secured at the pelvic brim. The tumour, being drawn to its own side, is then freed by dividing the cervix from the easy to the involved side, just above the vaginal vault. As the last fibres of the cervix on the involved side are severed, while the tumour with the uterus is being rolled outwards and drawn upwards in the opposite direction, the uterine vessels on the involved side coming into view are seized with forceps and ligatured. Rolling the tumour still further out, the round ligament of the involved side is next exposed, ligatured, and divided; and the whole mass is removed.

The operation is now finished by uniting the cervical flaps with a row of buried catgut sutures, over which the loosened peritoneum is drawn, its inverted edges being secured with Lembert's stitches of fine catgut. Any oozing or bleeding vessels are finally secured, and the toilet of the pedicle and peritoneum is completed. The final closure of the peritoneum is effected by drawing the anterior peritoneal flap (that derived from the front of the tumour, the bladder, and the anterior layer of the broad ligament) over the wound; and uniting it by continuous Lembert catgut suturing, to the posterior peritoneum and the posterior surface of the cervix, so as to completely cover in the stump. The abdominal wound is then closed in the usual way.

It was formerly objected to this form of operation, as compared with the extraperitoneal method, that its mortality was much higher; and this objection was then well founded, for of Schröder's 164 operations, nearly 30 per cent. died. Zweifel's improvements have, however, resulted in such a great diminution in the death-rate, that the intraperitoneal operation is now much the less dangerous. Of 90 operations reported by Zweifel (up to 1894), the mortality was only 3·2 per cent.; of 345 operations by American surgeons (1894-96), Noble reports 17 deaths, or 4·9 per cent.; and of 806 operations, chiefly by German surgeons, as reported by Olshausen, 45 died, or 5·6 per cent.

The Extraperitoneal Operation.

This is the operation that has hitherto almost exclusively been done in this country; and it is still the favourite procedure, owing to its simplicity and the force of routine. Although not yet obsolete in our conservative country, it must be regarded as obsolescent. Its distinguishing feature is, that the stump of the uterus is implanted in the abdominal wound, and fixed there.

The initial stages of the operation, the delivery of the tumour, and the freeing of the uterus, are done as in the intraperitoneal procedure. The pedicle (which is usually the cervix uteri) is isolated and drawn up into the lower part of the abdominal wound, where it is surrounded by a wire serre-nœud, such as Kœberlé and Tait have devised, which encircles it well below the tumour, and the noose is then gradually tightened. Large metal pins are passed transversely through the pedicle, on the distal side of the wire, to prevent its slipping. The wire noose holding the pedicle, is then fixed in this position; and the rest of the wound is closed around it in the usual way, the peritoneum being separately sutured with fine catgut.

On the Continent, Hegar's method of dealing with the stump has been more generally employed. The pedicle is constricted with a rubber ligature, instead of the wire

serre-nœud; and below the ligature the parietal peritoneum is sutured all round to the circumference of the pedicle. The constricted stump is thus made extraperitoneal.

In English hospitals, the results of the extraperitoneal operation have been most disastrous. Thus, of 18 such operations done at the Middlesex Hospital during the years 1884-1894 I have found that there were 8 deaths, or 44·4 per cent. Champneys reports that of 55 operations at St. Bartholomew's Hospital (1883-1899) there were 15 deaths, or 27 per cent.; and of 34 operations at St. Thomas's Hospital (1892-1897) 9 deaths, or 26 per cent.

Of 214 operations by German surgeons at about the same period, as tabulated by Hofmeier, 32 died, or about 15 per cent.; and in the United States the mortality has been nearly the same.

Of the Middlesex Hospital cases 3 died of shock, 3 of peritonitis, and 2 of septicæmia.

Those who recover are specially prone to large ventral hernias; and many have a troublesome discharging sinus left at the seat of pedicle implantation.

Hysterectomy.

Total extirpation of the myomatous uterus by the abdominal route is an operation that, in my opinion, is very rarely called for. There are, however, certain exceptional cases of diffuse myomatosis—involving the cervix as well as the corpus uteri, so that no pedicle can be formed—and a few other anomalous conditions, which may necessitate it.

The principles and technique of the operation are similar to those of panhysterectomy for malignant disease, which are fully described elsewhere (Chapter XIX.).

Doyen's modification, for removing the myomatous uterus, seems to require a brief description.

The abdomen is opened and—the patient being in Trendelenburg's position—the tumour is delivered, and drawn forward over the pubes. An opening is next made into the vaginal

vault, through Douglas' pouch. Through this the cervix is seized and drawn upwards, with a long-handled volsella—its lateral attachments being severed with scissors—which enables its anterior lip to be seized, when the anterior fornix can be divided; and finally, the cervix is drawn upwards and dissected off the bladder.

The left forefinger is then pushed from behind, under the right broad ligament; and the latter is divided between the ovary and the uterus. The left broad ligament is next divided in a similar way. To prevent hæmorrhage, the divided broad ligaments are temporarily held between the assistant's fingers, the severed bloodvessels being subsequently ligatured. Doyen maintains that preliminary clamping, etc., is a mistake. The long rent in the peritoneum is closed by continuous catgut suturing; and the wound is drained into the vagina. Tumours rendering the cervix inaccessible are to be rapidly removed by enucleation, etc.

Of 147 operations of this kind, Doyen reports that only 7 died, or 4·7 per cent.; but such results can only be obtained when dealing with comparatively small tumours, for which, according to my ideas, hysterectomy is inadmissible.

Of 520 panhysterectomies for myomatous disease, mostly by German surgeons, Olshausen reports that 50 died, or 9·6 per cent.

Myomata of the Uterine Ligaments, Adnexa, etc.

Myomatous tumours not infrequently arise in the vicinity of the uterus, quite independently of the uterus itself; the favourite seats of these formations are the broad and the round ligaments, and exceptionally the ovarian ligaments, the Fallopian tubes, etc.

In their general features these autochthonous tumours resemble their uterine congeners. Thus, they may be subserous or interstitial, sessile or pedunculated, single or multiple; and they are liable to cystic, telangiectasic, calcareous, inflammatory, and other changes.

True broad ligament myomata generally develop between the peritoneal folds—intraligamentous—often spreading in the perivaginal tissues. They are generally small or of moderate dimensions; but exceptionally large tumours are met with, and Doran has lately described a specimen weighing 44½ pounds. Those of pelvic evolution are apt to become incarcerated, causing severe pressure symptoms, which may necessitate operation. It is difficult to discriminate such formations from uterine and ovarian tumours, until the abdomen has been opened.

Abdominal enucleation is generally the best treatment, the resulting cavity being closed with superposed layers of buried catgut sutures, over which the inverted margins of the peritoneal flaps are sutured.

When, owing to special difficulties, this cannot be satisfactorily effected, the bed of the tumour may be plugged with sterilised iodoform gauze, the free end of which is passed into the vagina, the margins of the bed of the tumour being sutured over the plug, as above described; but with scientific hæmostasis such a step is seldom necessary.

Broad ligament myomata of perivaginal development, may sometimes be advantageously removed *per vaginam*.

Pedunculated tumours of this kind should be treated like their uterine congeners.

Myomata complicated with Pregnancy.

Under the influence of pregnancy myomata soften, and become much more plastic than in the unimpregnated state. Hence it is rare for tumours thus complicated to cause dangerous symptoms, notwithstanding their increase in size. Most of those affected go to full term, and are delivered without special difficulty. Davis has reported the history of a woman with extensive myomatous disease, who successfully went through eight pregnancies without any ill effects.

Even when very large tumours are present, parturition often terminates normally; while myomata under the size of the fist seldom cause any difficulty whatever.

Surgical intervention is, therefore, only required when urgent symptoms arise that specially demand it.

In a general way, it may be said that tumours growing from the lower segment of the uterus, are more likely to cause dangerous symptoms, than those growing from the corpus uteri; interstitial tumours than the subperitoneal; sessile forms than those that are pedunculated; and large tumours than small ones.

There is a growing conviction, that surgical interference with the gravid uterus is much safer at or near term, than at any other time; hence, wherever possible, such proceedings as are necessary, should be deferred until this period. Many unnecessary operations will be avoided by strict adhesion to this rule.

During the course of pregnancy, however, surgical intervention may be called for, owing to the supervention of various complications, such as pressure symptoms—whether associated with incarceration or not—inflammation of the tumour, torsion of the pedicle of a subperitoneal tumour, etc.

During parturition, dystocia, hæmorrhage, rupture of the uterus, placenta prævia, and abnormal presentations, are the complications most likely to call for intervention.

Retention of a dead fœtus, or the products of conception after miscarriage, may also require special treatment.

There is, however, general agreement, that the chief danger of pregnancy complicated by myoma, arises from septic infection of the tumour owing to its injury, leading to inflammation and gangrene, with consequent septicæmia.

In dealing with myomata complicated by pregnancy, it should be borne in mind that two lives are involved; and, if possible, both should be saved. This consideration will deter the surgeon from advising evacuation of the uterine contents, prior to the seventh month of gestation; and at a subsequent period such a course will seldom be desirable, for the maternal and fœtal mortality is considerable, as compared with the results otherwise obtainable.* Viable children ought generally to be saved.

* According to Süsserot, of 147 pregnancies complicated by myoma, in 20 of which the forceps was applied, the result was that 8 mothers and

In the rare event of myomatous tumours requiring removal prior to the seventh month of gestation, this may be effected by vaginal or abdominal myomectomy or enucleation, the choice of operation being determined by general considerations. In such procedures, care should be taken not to disturb the gravid uterus more than is absolutely necessary.

The vaginal operation—if otherwise applicable—is specially suitable for dealing with septically infected tumours of vaginal evolution; but care must be taken not to mistake the fœtal head for a myomatous tumour, as has happened more than once. The results are better than by any other method.

It has been estimated that abdominal enucleation is attended with a maternal mortality of about 15 per cent.; and that 35 per cent. of the fœtuses are lost, owing to subsequent abortion.

When the pregnancy has gone on undisturbed to an advanced period or to term, it is generally best to remove the child by Cæsarian section; and at the same time to enucleate the tumours. Porro's operation is an alternative procedure, the mortality of which has been estimated at from 20 to 30 per cent.

Myomata complicated with ectopic gestation, must be dealt with in accordance with the general considerations, governing the treatment of these conditions.

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15 children succumbed; version was performed in 20 cases, 8 mothers and 17 children being lost; in 21 cases the placenta was artificially extruded, and in 13 of these the mother died. Collectively the mortality of the mothers was 53 per cent.; and that of the children 66 per cent.

CHAPTER XIII

THE PALLIATIVE TREATMENT OF MYOMA

Oöphorectomy.

No operation for myomata has had a wider vogue than double oöphorectomy, which originated with Tait and Hegar in 1872.

Its mortality, however, is considerable, viz., about 10 per cent., for only in Tait's practice has this average been much reduced, and in many cases it has been found impossible to complete the operation.

Oöphorectomy has been more successful in arresting hæmorrhage, than in diminishing the size of tumours. Most of those benefited have been comparatively young women, with myomata of no great size. Very large tumours, cystic and subperitoneal forms, those of the 'œdematous' variety, inflamed tumours, and those complicated by pressure symptoms, are seldom benefited.

When we consider these limitations, the mortality of the operation, the poor results attainable as compared with other proceedings, and the morbid conditions entailed by the loss of both ovaries, it is evident that such operations ought seldom, if ever, to be undertaken.

According to Tait, such good results as have ensued cannot be ascribed to removal of the ovaries, but rather to ablation of the tubes. In the light of recent experience, it seems to me much more probable that it is due rather to the incidental occlusion of the utero-ovarian bloodvessels, than to ablation of either ovaries or tubes; and this is much more effectually secured by tubal than by ovarian resection.

Ligation of the Uterine Bloodvessels per Vaginam.

A more rational and effective method for controlling the hæmorrhage of myomata is vaginal ligation of the uterine bloodvessels, as practised by Martin of Chicago since 1892.

This operation entails no mutilation, the risk to life is but slight, and the results attained are as good as those of oöphorectomy.

For the treatment of anæmic women, so weakened by hæmorrhage that any radical proceeding would be dangerous, vaginal ligation may be a useful resource; and this operation is also available as an alternative, when more radical treatment is refused.

The object is to secure the uterine bloodvessels at the base of the broad ligament on each side of the cervix, by incision through the vaginal vault.

The initial steps of the operation are similar to those for vaginal hysterectomy. The vaginal fornix is transversely incised in front of the cervix; and at each end of the resulting transverse wound, a lateral incision is made at right angles to it. The bladder is separated in front, and the peritoneum behind. The former viscus is then drawn up with a retractor. With the finger inserted into the lateral incision, the pulsation of the uterine artery can be felt. A curved pedicle needle, threaded with silk ligature, is then passed up behind the vessels; and the broad ligament is transfixed above them at a distance of an inch or two from the uterus, when the ligature is firmly tied and left long. In like manner, another ligature is passed close to the uterus, and tied there. The tissues between the two ligatures are then severed, and the latter are cut short. This procedure is done on both sides. The vaginal incisions are then sutured, and the vagina is lightly packed with iodoform gauze.

Over forty operations of this kind have been done without a single fatality.

Electricity.

The treatment of myomata by galvanic electricity, as recommended by Apostoli, has of late been extensively

employed. For dealing with small and moderately-sized tumours, in which hæmorrhage and pain are the chief symptoms, it has proved a fairly successful palliative. This method is not altogether free from danger, especially when inflammatory complications co-exist, such as pelvic peritonitis, salpingitis, pyosalpinx, ovaritis, etc. There is also considerable danger of causing septic infection of the tumour by wounding it, especially when the electrode is introduced within the uterine cavity. Electro-puncture is on this account most objectionable. There is also danger in using strong currents, which are unnecessary for getting the best therapeutic results. Owing to neglect of these indications, we have to deplore a mortality of 3 per cent after this treatment; and in a certain number of cases the patient's symptoms have been aggravated thereby.

The positive electrode is introduced into the vagina, while the negative one is placed over the tumour, on the lower part of the abdominal wall. The former consists of a platinum or carbon rod; the latter comprises a broad, flat copper plate covered with clay, several layers of moist gauze, or some other non-conducting material.

Currents of from 50 to 60 milliampères usually suffice; but Apostoli employs currents of much greater intensity—even up to 250 milliampères. A galvanometer should always be at hand, to indicate the strength of the current used in each case. A course of treatment usually consists of a dozen or more applications of about ten minutes each, with an interval of a few days.

Faradic currents have also been beneficially employed in the treatment of myomata.

Other Therapeutic Indications.

Rest in the semi-prone posture before, during and after the menstrual periods is desirable, when serious symptoms are present; and myomatous patients should always be abstemious in their diet, especially as regards meat and drink.

Whatever favours congestion of the pelvic viscera should be avoided. The bowels should be carefully regulated, the tendency to constipation being combated by mild laxatives, saline aperients, mineral waters, enemata, etc. Iodide and bromide of potassium, nux vomica, arsenic and digitalis are drugs that may be usefully employed in this connection; but ferruginous preparations do more harm than good.

Brine and other baths are generally beneficial, probably because they tend to diminish the local congestion, and to improve the general health; hence the good results often attained by visits to such spas as Kreuznach, Kissingen, Vichy, Carlsbad, Royat, Salins, etc.

One is sometimes asked whether the subjects of myomatous disease ought to marry. To this it may be answered that it is best for those to abstain who have large tumours, or tumours that cause serious disturbance to the general health. If such persons marry, they will be relatively infertile; an unduly large proportion of those who conceive will miscarry; and the risks of delivery for both mother and child will be in excess of the normal (*q.v.* Chapter X., p. 124 *et seq.*).

A well-fitting abdominal belt should be worn by patients with large tumours.

It is well to bear in mind, that pressure symptoms may often be relieved by reducing the incarcerated tumour from the pelvis into the abdomen, and correcting any uterine displacement. This may be effected by upward pressure from the vagina or rectum, the patient being in the genu-pectoral position. Some surgeons have employed hydrostatic bags, etc., for this purpose.

Pressure symptoms associated with small tumours, are generally due to concomitant uterine displacement, which should be corrected.

It is often necessary to check the hæmorrhage caused by myomata, and for this purpose vaginal irrigation with hot water, recently sterilized by boiling, is a valuable aid. If necessary, the vagina must be plugged. This is best effected by gradually packing it with a single long strip of sterilized iodoform gauze, introduced through a speculum, the initial

insertions being pressed well into the vaginal vault, while the free end is left projecting from the vulva. The bladder should be emptied before proceeding with the plugging.

Ergot is a valuable aid to hæmostasis in these cases, $\frac{1}{2}$ drachm of the liquid extract being given by the mouth thrice daily. Hypodermically administered, its action is rapid and efficacious; and the injection is best made into the gluteal muscles, the patient resting in bed afterwards. Ergotinine citrate ($\frac{1}{100}$ grain) and sclerotinic acid ($\frac{1}{2}$ grain) are used for this purpose. The injection of ergot or its preparations, directly into the uterine wall or into myomatous tumours, is a dangerous proceeding that cannot be too strongly condemned.

Lately myomatous patients have been treated with thyroid and mammary gland extracts, and, it is alleged, with some benefit (Polk, Hertoghe, Shober, etc.). It appears that most forms of uterine hæmorrhage diminish under the influence of thyroid extract, and this applies especially to menorrhagia, while its efficacy in relieving congestion is also very marked.

CHAPTER XIV

OTHER NON-MALIGNANT TUMOURS, CYSTS, DERMOIDS, AND POLYPOID PSEUDOPLASMS

Non-malignant Tumours other than Myoma.

It is remarkable that the capacity of the uterus to originate non-malignant tumours—other than myomata—appears to be almost nil. I have never seen a single instance of true fibroma of the uterus; nor can I cite a duly authenticated example of this kind, in the voluminous literature of uterine tumours.

A few instances of so-called 'lipoma uteri' have been reported; but, it seems probable that in most of these cases, we have to do with fatty changes supervening in myomatous tumours rather than with true lipomata. In Brünings' case —which has been described in Chapter VII., p. 97—the tumour was regarded as a lipo-myoma. Brünings thought his case unique; but he has evidently overlooked the very similar instances, recorded many years ago, by Seeger and Busch. Seeger's patient, who was fifty-five years old, had a tumour the size of a child's head projecting from the vulva, which was connected with the cervix uteri by a pedicle. She had been subject to menorrhagia for a year previously. After its removal, the tumour, which weighed 3½ pounds, presented a yellowish, lobulated appearance, just like an ordinary lipoma. Busch's patient, who was fifty years old, having been subject to leucorrhœa for eleven years, then expelled from the vagina a tumour the size of a man's fist, which appeared to be composed entirely

of fatty tissue. An offensive vaginal discharge, containing fatty matter, continued for some time afterwards.

Stroinski reports having found a small lipoma connected with the anterior lip of the os uteri; and T. Smith, within a polypoid intra-uterine myoma, found a cyst and 'a small fatty tumour.'

Although none of these cases, taken by themselves, are perhaps perfectly convincing, it is likely that fatty tumours do arise in the uterus; since such heterotopic structures as cartilage, bone, striped muscle, mucous and fatty tissues have often been met with in this situation; while instances of fatty tumours occurring in the broad and round ligaments, and in the retroperitoneal pelvic connective tissue, are well known; and Pelletan has met with tumours of this kind in the rectovaginal septum.

In ancient literature, one finds reported many examples of osseous tumours of the uterus; but upon examination, it is evident that most of these refer to calcified myomata. True, bone and cartilage have, however, been met with in myomatous tumours (Henle, Bidder, Freund, etc.).

Miller has lately reported a case in which a bony tumour was found in the malformed uterus of a girl sixteen years old, in whom the vagina was absent. The tumour presented as a pear-shaped mass—weighing nearly 6 ounces—which occupied the site of the corpus uteri, of which one of the tubes appeared to be absent. It was composed throughout of compact bone, as determined by histological examination. J. T. Williams has described a case of ossification of the uterus—which contained a well-preserved fœtus—in an aged negress.

In the old literature, a few cases of enchondroma of the uterus (Wagner, Sigmund, etc.) are also mentioned; but as these tumours manifested malignant properties, they would now be described as chondrifying sarcomata, of which several examples have lately been reported in the uterus.

Certain polypoidal uterine tumours are occasionally met with, which are composed almost entirely of vascular structures. Wild not long ago described a case of this kind as

'uterine angioma.' Several similar cases may be found in the older literature (Ungar, Barnes, Murphy, etc.). Falk has lately met with an instance in which the whole of the cervix had undergone angiomatous transformation, the patient being a three-para, aged twenty-four.

Cysts.

Cysts of the uterus, forming clinically appreciable tumours, are exceedingly rare, independently of myomata, and they have been but little studied.

The discovery of aberrant glandular structures in the uterine wall—to which allusion has already been made—enables us to understand the source whence many tumours of this kind arise. These structures have been described as of Wolffian, Müllerian and mucosal origin. Probably all these sources are represented. Such cysts are lined with cylindrical or cubical epithelium, which may be ciliated.

In the antero-lateral part of the cervix and the adjacent part of the uterus, cysts are occasionally found — lined by cubical epithelium quite different from that of the cervical glands—which, it appears certain, are derived from cystic dilatation of unobliterated portions of the Wolffian duct (Gärtner's), such as Tourneux and Nagel have demonstrated.

Most of the so-called atheromatous or cholesteatomatous cysts of this part—of which several examples have lately been reported—probably originate from this source (Cornil, Recklinghausen, Allen, etc.).

Mears has reported an instance of polycystic changes affecting the uterus, both ovaries and kidneys simultaneously, as if due to some developmental irregularity affecting the evolution of the whole Wolffian body.

Czerwenka has met with an instance of 'cyst-adenoma papillare proliferans' in the uterus.

Cystic distension of the uterus from retained fluids, sometimes produces a condition resembling uterine cystoma. In like manner, cysts may arise from the distension of diverticula

of the uterine cavity, such as are met with in uterus accessorius, bifid and trifid uterus, and allied conditions.

Endothelial-lined cysts, believed to be of lymphangiectasic or telangiectasic origin, have been described by Leopold, Fehling and others. Hahnsseau has met with certain cysts of this kind, caused by traumatisms due to operations on the uterus and its adnexa.

Webster has published an excellent account of a large blood cyst, which was successfully removed by supravaginal amputation from a woman aged fifty-three. It grew from the fundus uteri, and contained several pints of dark sanguineous fluid. Its pedicle consisted largely of angiomatous tissue, and the author believes that the cyst was of angiomatous origin.

Small multiple cysts are of more frequent occurrence in the cervix than elsewhere; and their identity with the cervical glands may be demonstrated histologically, as well as by the peculiar nature of their fluid contents. The well-known ovula Nabothii, are the physiological prototypes of these cysts.

In certain forms of glandular endometritis, the uterine parenchyma may be invaded by small glandular cysts, of which Löhlein has lately described a good example.

A curious form of cystic degeneration of the cervix, in which the part is riddled with small air-containing vesicles, has been described by Winckel as 'colpohyperplasia cystica.'

At least a dozen instances of hydatid cysts of the uterus have also been recorded, and these cysts occasionally form in the peri-uterine connective tissue, etc.

Clinically appreciable cysts are more frequently connected with the corpus than the cervix. Subperitoneal forms are of much commoner occurrence than interstitial or submucous ones. They may be single or multiple; and they are generally multilocular. Such cysts sometimes attain the size of the fœtal head. Their contents generally are serous, sanguineous or puriform fluids. Several instances of sudden death have been reported, owing to the rupture of such cysts

into the peritoneal cavity; and they have been known to discharge into adjacent organs, such as the large intestine, etc.

Dermoids.

The researches of Sänger have made it perfectly clear, that dermoids do originate in the retroperitoneal pelvic connective tissue, quite independently of the ovaries. Thus, they have been found in the peri-rectal connective tissue, in the recto-vaginal septum, in the bladder, in the rectum, etc. Such being the case, we may expect occasionally to find formations of this kind in the uterus itself.

In ancient and modern literature several instances of alleged uterine dermoids have been recorded; but none, I think, with sufficient precision to satisfy modern requirements.

Vicq d'Azir long ago reported: 'Sur un corps de forme ovale et rempli de poils trouvé dans la matrice d'une fille âgée de 56 ans.'

Fabrice de Hilden mentions the case of a woman, aged fifty, in whose uterus a mass of hairs, fatty and oily substance was found.

Jarjavay has described a case of 'kyste pileux de l'utérus qui s'est ouvert à la partie inférieure de la paroi abdominale antérieure.'

Sampson saw a mass composed of hairs, bone and thirteen teeth, expelled from the uterus, immediately after the birth of a stillborn child.

Osiander has also reported a case in which a membranous sac, enclosing fatty substance, an ill-formed bone with five teeth, and a number of long hairs, was expelled after delivery.

Meckel mentions an instance, in which the birth of a child was preceded by the expulsion of a mass containing hairs.

In a recently delivered woman, aged thirty-four, E. Wagner found a tumour connected with the posterior part of the cervix uteri; which, after removal, was found to contain

hairs, teeth, bits of bone, and cartilage. The patient recovered from the operation.

Bedford, half a century ago, described in one of the New York journals a 'sarcomatous tumour containing hairs and stearine,' which was removed from the uterus.

In comparatively recent times examples of uterine dermoids have been described by French and Shoemaker.

The latter's patient was a two-para, aged fifty-eight, who had been married for nineteen years. The menopause supervened at forty-four. She was thin, small, and had a prematurely aged appearance. During the last year, she had been subject to irregular, offensive sanious vaginal discharge, together with burning pain in the sacral and hypogastric regions, and frequent painful micturition. On vaginal examination, the portio was found to have disappeared, the anterior cervical wall was swollen, eroded, and bled when touched; while the corpus uteri was much enlarged and soft. With a curette, soft cheesy substance was brought away. She had been steadily emaciating for a year. Malignant disease of the corpus uteri was diagnosed. The whole uterus was removed by abdominal hysterectomy, and the patient recovered. On laying open the uterus, its greatly enlarged cavity was found distended with rounded masses of fœtid, cheesy material; these were free in the uterine cavity. No hairs or other epidermoidal structures were found. A calcified myoma—half an inch in diameter—was embedded in the posterior wall of the uterus, just below the origin of the left tube. The ovaries and tubes were normal, except that the former were small and partially calcified.

Such being the facts, it is impossible to feel certain that we here have to do with a true dermoid cyst. It seems to me more likely that the intra-uterine cheesy mass was due to the discharge of a so-called 'atheromatous cyst' into the uterine cavity. There can be no doubt that such cysts are nearly always derived from unobliterated remains of the Wolffian duct (Gärtner's), of which Burckhardt and others have reported instances.

Polypoid Pseudoplasms, etc.

Subacute inflammatory processes often cause tumour-like outgrowths, of a more or less polypoid nature, to spring up in the uterus. The mucosa is the commonest matrix for these pseudoplasms, but in many cases the subjacent structures are involved.

The cervix and portio are their seats of election, and they are commonly multiple.

Outgrowths of this kind are often concomitant with malignant and myomatous tumours, being an outcome of the general hyperplasia that generally accompanies these neoplasms.

Such formations are themselves of an innocent nature, and they hardly ever originate malignant disease.

A few instances of this contingency have, however, lately been reported, *e.g.*, by Gessner, Mackenrodt, Veit and John Williams.

The last-named has described an instance, in which squamous epithelial cancer is supposed to have developed from a small mucous polypus, that projected from the os. The apodal extremity of this outgrowth, was capped with a thick layer of epidermoidal epithelium, with some ingrowing processes; and this was thought to justify the diagnosis of cancer. The rest of the surface of the polypus was lined with columnar epithelium, with gland-like ingrowths, as in 'channelled polypi,' there being no other indication of malignancy.

It seems to me that this heterotopic squamous epithelium was probably derived from one of those epidermoidal islets, such as Villiers and Thérèse have lately shown to exist in the midst of the cervical mucosa; and I think that such irregularities of growth as were noticeable, are no more than might be expected to be found in association with congenital flaws of this kind.

It accords with this, that several instances of perfectly innocent 'channelled polypi' have been described (Oldham, Underhill, Küstner, Zeller, Matthews Duncan, etc.) in which

islets of stratified epidermoidal cells, have been demonstrated in the midst of the single layer of columnar cells, lining the rest of the surface of the polypus. This is commonly referred to, as an example of the facility with which surface epithelia change their type (polymorphism); but, in the light of recent research, I think it is much more likely to be due to congenital or acquired heterotopia.

Mucosal polypi generally present as small, soft, vascular outgrowths, in size and shape resembling a pea or an almond (Fig. 27, p. 79, P, P, P). Rarely they attain larger size. The length of the pedicle varies, but the smaller specimens are generally more or less sessile. They are usually multiple, and the cervix is their favourite seat. The mucosa of the corpus is rarely affected independently of the cervix. In some forms of endometritis these polypi form in great numbers. Besides neoplasms, pregnancy, menstrual disorders, and certain infective processes, often seem to determine their formation.

All the structures normally present in the mucosa whence the polyp originates, are generally represented in its structure, although in varying degrees. Œdematous connective tissue, containing a variable quantity of cellular elements, in which glandular structures are found, comprises the bulk of most specimens. Small cysts often develop from the latter. Cervical polyps are generally covered throughout by a single layer of columnar, 'caliciform,' epithelium, which presents many more or less ramified, quasi-glandular ingrowths into the polypoidal substance, like the crypts, etc., normally present in the cervical mucosa. This is the variety often described as 'channelled.'

In some specimens bloodvessels are largely developed. Thus, mucosal polypi present areolar, glandular, cystic and vascular forms. They are nearly always associated with endometritis.

Polypoid outgrowths from the deeper tissues are commonest in the portio, and especially in the vicinity of the os; the whole of the portio, one or both of its lips, or more circumscribed areas only, may be thus affected. These

pseudoplasms are of much firmer texture and more bulky, than their mucosal congeners.

They generally consist chiefly of fibrous tissue, in which glandular elements are embedded.

According to the predominant constituent, fibrous, glandular, cystic (Fig. 41) and telangiectasic varieties may be discriminated.

These formations are nearly always associated with more

FIG. 41.—LONGITUDINAL SECTION OF THE CERVIX AND VAGINA, PASSING THROUGH AN ADENO-CYSTIC POLYPUS OF THE ANTERIOR LIP OF THE OS UTERI. (PÉAN.)

or less chronic metritis; and in the vicinity of the os they are often the outcome of lacerations.*

* Gynæcologists are constantly talking about an imaginary form of uterine tumour, which they call 'adenoma,' malignant and non-malignant forms being admitted. In my opinion there is no uterine neoplasm to which the term 'adenoma' can properly be applied. The so-called 'malignant adenoma' is merely a form of cancer; and the non-malignant 'adenomata' are nothing but inflammatory pseudoplasms, 'erosions,' 'glandular endometritis,' etc.

The co-existence of different kinds of polypi in the same uterus has been noticed several times.

Outgrowths, such as the foregoing, are very rarely met with in infancy, childhood or youth.

Most of the polypi of early life—which are multiple—arise from developmental flaws, and are of a more or less malignant nature. Such formations are rare in the uterus; I shall have to refer to them again in a future chapter (Chapter XX.).

A congenital form of mucosal polypus has lately been shown to be of not uncommon occurrence, at the internal os, surmounting the anterior column of the arbor vitæ. Its structure is akin to that of the cervical mucosa. Friedländer, Maudach and Spencer, have described instances of this kind in newly-born children. There is often concomitant general enlargement of the uterus, which may be complicated with retention of secretion owing to obstruction of the outflow by the tumour. The condition is probably due to some slight flaw, in the fusion of the various ducts, that concur in the formation of this part. So far as is known, these formations have no tendency to become malignant.

The chief symptoms of polypi in adults are leucorrhœa, menorrhagia, and irregular hæmorrhages; and indications of endometritis are generally present. Dysmenorrhœal pains may be added when the polypus is intra-uterine. In many cases polypi cause no noticeable inconvenience.

The only way of distinguishing certain intra-uterine pseudoplasms, from correspondingly located neoplastic manifestations (myoma, sarcoma, cancer, etc.), is by intra-uterine digital exploration; which can generally be most effectually done at the catamenial period, when the cervix naturally dilates.

It is well to remember, however, that the presence of polypi within the uterus, seldom causes such marked nodular or irregular enlargement of the organ, as neoplasms produce; and the other symptoms are usually less severe.

Small polypi may be removed with the curette; larger ones can be twisted off with polypus forceps. The more bulky

outgrowths—in which fibrous tissue predominates—may be removed by dividing the pedicle, after ligation.

Intra-uterine forms should be treated on the same lines as intra-uterine myomata.

In consequence of various irritations, papillated pseudoplasms not unfrequently arise from the portio. Such formations may be diffuse or discrete, multiple or solitary; and sometimes they attain considerable size.

Pregnancy, gonorrhœa, syphilis, tubercle, and malignant neoplasms, are the commonest ætiological factors.

Besides hypertrophied and newly-formed papillæ, covered with stratified epithelium, most outgrowths of this kind comprise also a large proportion of fibrous tissue (fibroma papillare), and the bloodvessels may be unduly developed. When the papillary ectasia is very marked, the disease is apt to assume a spongy, villous, or dendriform aspect, to which the term 'cauliflower excrescence' has been applied. Such conditions are not necessarily malignant, although they may be associated with cancer, the irritant discharges of which often cause these outgrowths.

This condition is rare in early life, but Lewis Marshall has reported an instance in an infant aged two years and seven months, and Guersant has met with it at three and a half years.

The chief symptoms are watery leucorrhœa at first, which after a time becomes sanious; and at a later period there may be irregular hæmorrhages.

Some papillary excrescences disappear, when the morbid conditions which cause them have ceased to exist; others require to be removed by operation; and for diffuse forms amputation of the cervix may be necessary.

CHAPTER XV

THE MORPHOLOGY OF UTERINE CANCER

Introductory.

CANCER of the uterus is a disease of such a horrible nature, and of such frequent occurrence; that it would be a disgrace to medical science if its study were neglected. The expectation of finding a cancer microbe, that will account for all the phenomena of the disease, has paralysed research in other directions for the last quarter of a century. The kind of attitude thus engendered, is well displayed by the following Sibylline utterance of a well-known London surgeon:

'Cancer of the uterus is so frequent and has been so thoroughly studied, that it would be difficult to say anything new about it, until its cause is discovered.'

Unfortunately, whilst this attitude of masterly inactivity has been in vogue, the disease has doubled in frequency; so that the time seems to have come for studying it in a scientific manner, without indulging unduly in prepossessions.

According to an estimate I have made, over 10,000 women are now (1898) suffering from uterine cancer in England and Wales. In this country it is, next to mammary cancer, the commonest cancerous manifestation in women. I estimate that one in thirty of all women over thirty-five, eventually dies of cancer of the breast, and one in thirty-five of uterine cancer.

Moreover, the modern practice of resorting to radical operations for its cure, necessitates carefuller study of its morphology, than has hitherto been deemed necessary; for

it is obvious that, in such procedures, morphological considerations are of primary importance.

The term 'cancer,' after having in the past undergone repeated changes of meaning, is now used in such different senses; that it is necessary for those who employ it, to state precisely what they mean by it. In the popular sense, every malignant neoplasm is a cancer. In medical science, however, the term is usually restricted to certain malignant neoplasms, viz., to those of epithelial origin; and this is the sense in which I employ it. This view of the origin of cancer, which we owe chiefly to Waldeyer and Thiersch, has replaced the older doctrine of the connective-tissue origin of the disease, as propounded by Virchow and his followers. Hence, we must look to pre-existing epithelial cells, for the germs whence cancers arise. It is necessary to insist upon this, because such able investigators of uterine cancer as Ruge and Veit, still uphold the ancient doctrine.

Briefly stated, the chief features of the disease, as it appears in the uterus, are as follows:

The initial manifestation usually takes the form of a small, solitary nodule, which appears in the mucosa of the cervix; and, as it increases, interpenetrates the contiguous structures, eventually completely destroying them.

As the initial nodule increases in size, it generally forms a more or less projecting, tumour-like excrescence; and, at the same time, the neoplasm invades the adjacent tissues of the cervix.

At a subsequent period ulceration supervenes, from which deep excavations result. The tendency of the disease is to spread downwards, forwards and outwards into the portio, the vagina, the pericervical tissues and the base of the bladder—the latter structure being invaded long before the rectum. In consequence of these extensions the uterus becomes fixed, and pelviperitonitis is common. As the disease spreads towards the base of the bladder, the ureters are compressed; and this gives rise to hydronephrosis, nephritis, renal atrophy, etc. The advent of ulceration in this locality causes perforation of the bladder, cystitis, and

sometimes pyonephrosis. Intercurrent complications of this kind, in which uræmia plays an important part, often determine the fatal issue, before the cancerous disease itself has had time to fully manifest its lethal effect.

In most cases, prior to the onset of ulceration or subsequently, the disease disseminates in the adjacent ilio-pelvic lymph glands; and secondary cancerous growths develop there. Finally, in a certain—not very large—proportion of cases, similar growths arise in various remote parts of the body, such as the lungs, liver, peritoneum, etc. In all probability, but for the frequent supervention of fatal intercurrent complications at a comparatively early stage of the disease, disseminative growths would be of more frequent occurrence than they actually are.

According to my calculation, the average duration of the disease from beginning to end is only about two years;* whereas, the duration of mammary cancer is from four to five years.

Some forms progress more rapidly than others; but chronic varieties are comparatively rare. The duration of life, in ninety fatal cases of cervical cancer, I have found to be as follows:

Under 6 months in 4 cases.				From 36 to 42 months in 5 cases.			
From 6 to 12 months in 20 cases.				„ 42 to 48	„	4	„
„ 12 to 18	„	22	„	„ 48 to 54	„	2	„
„ 18 to 24	„	13	„	„ 54 to 60	„	1 case.	
„ 24 to 30	„	10	„	„ 60 to 66	„	1	„
„ 30 to 36	„	6	„	„ 96 to 102	„	2 cases.	

The most acute case ran its course in 4·7 months; while 99·9 months was the duration of the most chronic case.

Cancer of the corpus progresses less rapidly than cancer of the cervix, the average duration of life, in this form of the disease, being—according to Pichot—about thirty-two months.

* This exceeds the estimate given by most authors, *e.g.*, Gusserow 12 months, Lebert 16 months, Courty 16 to 17 months, M. Duncan 17·3 months, Arnott 19·2 months, etc. Simpson, however, puts the total duration of life at from 2 to 2·5 years.

General Morphology.

The different constituents of the uterus, vary greatly in their relative proneness to malignant and other neoplasms.

Thus, while countless thousands of cancers have sprung from the uterine mucosa, I know of only two instances, in which the disease has originated from its peritoneal lining membrane.

It will be remembered that the epithelial cells whence the uterine mucosa is derived, originate nearer the genital ridge than those of the peritoneal membrane. Moreover, before the tubo-utero-vaginal involution takes place, the former cells have acquired a thickened, more or less columnar shape; so that in their origin and structure they resemble—and are evidently nearly akin to—their congeners of the genital ridge, which furnish the ovigerms. I would suggest that this great relative proneness of the epithelium of the uterine mucosa, to take on proliferative cancerous changes, is due to the awakening in its constituent cells of potentialities thus derived.

Another matter requiring consideration in this connection, is the great diversity in liability to cancer and other neoplasms, manifested by the various structures evolved upon the different segments of the Müllerian ducts. For instance, of 4,628 consecutive cases of primary cancer in females tabulated by me, 1,571 were uterine, as compared with only 40 of the vagina; while not a single one originated from the Fallopian tubes—in fact, altogether there are on record, not much more than a score of cases of primary cancer of the Fallopian tubes!

Moreover, the various segments of the uterus itself, differ greatly in their relative liability to cancer and other neoplasms. Thus, its lower segment (cervix and portio), is much more apt to generate cancer than its upper segment (corpus). Of 160 consecutive cases of uterine cancer, under my observation, only 4 were of the corpus, or 1 in 40; and this is a fairly representative series.*

* Some surgeons seem to think, that cancer of the corpus is of more frequent occurrence than my figures show; but this is because their lists comprise only cases specially selected for their operative suitability, which are not truly representative (Krukenberg, Penrose, Pichot, etc.). The numerous cases tabulated by Blumenfeld and Bäcker from post-mortem

Curiously enough, the liability of the uterine musculature to originate myoma, is just the converse of that of its mucosa to originate cancer; for the great majority of myomata arise from the corpus.

What is the explanation of these remarkable diversities in morbid proclivity? We must, I think, seek an answer to this question in the biological peculiarities inherent to the affected parts, and in their concomitant developmental and structural diversities, all of which are ultimately ascribable to functional modifications.

The classification of uterine cancers, may best be based upon their histogenesis. Accordingly, the different varieties are determined by the type of epithelium whence they originate; that is to say, they are either of the **cylinder-celled** (mucosal or glandular), **epidermoidal-celled**, or **endothelial** variety. The old terms 'scirrhus,' 'encephaloid' and 'epithelioma,' as applied to uterine cancers, have now become misleading and obsolete.

The term 'adenoma,' as applied to any form of uterine malignant disease, is a monstrosity of pathological nomenclature, that ought to be sharply repudiated notwithstanding its modernity.

Much difference of opinion exists among pathologists, as to which of these forms of uterine cancer is the commonest; according to my observations, the great majority of uterine cancers (about 90 per cent.) are of the cylinder-celled (mucosal or glandular) variety; which must therefore be regarded as the typical form in this organ.*

Since both cylindrical and epidermoidal epithelium, may be met with in each uterine segment—corpus, cervix and portio—so likewise, each of these parts, may originate both varieties of cancer. While, however, cylinder-celled cancer

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records, give results very similar to mine. Thus, of Blumenfeld's 678 uterine cancers, only 17 were of the corpus, or 1 in 39; and of Bäcker's 683 cases, 22 were of the corpus, or 1 in 31.

* According to Cullen, of 141 cancers of the lower part of the uterus, 123 were of the squamous, and only 18 of the glandular type. Such a result could only be arrived at, by interpreting the histological appearances differently to what I have done; and I believe that Cullen's interpretation is erroneous.

arises with predominating frequency, alike in the cervix, portio and corpus; it is most exceptional for epidermoidal-celled cancer to take origin in the corpus.

It has been clearly demonstrated, that cancer of the corpus is much less common than cancer of either the cervix or portio; but, a question of some difficulty arises, as to the relative proneness of the cervix and portio to originate the disease. Most pathologists consider the cervix to be the more liable, and in this I concur.*

Cancer of the cervix may arise from any part of the canalis cervicalis; but most cases take origin from its lower portion—in the vicinity of the os externum—and it is probable that the majority arise anteriorly.

Most cancers of the portio also arise in this vicinity, but the disease may start at any point between the os and the fornix of the vagina. In the corpus, cancer originates oftener in the region of the fundus and its vicinity, than elsewhere.

In both the cylinder-celled and epidermoidal varieties, the initial lesion usually is a small solitary nodule; only rarely is diffuse infiltration, or a superficial plaque met with, as its first obvious manifestation.

The question of the occasional origin of uterine cancer from more than a single primary focus; and that of its origin from non-malignant new formations, I have elsewhere discussed. I must also dismiss the epidermoidal variety from further consideration here, as it can be more conveniently described in a future chapter. The following account of the disease refers, therefore, exclusively to the cylinder-celled variety; which must be regarded as the typical form of uterine cancer.

* Of 50 cases specially examined by Saurenhaus for the purpose of determining this question, 31 were of cervical, and 19 of portio origin; and of Bäcker's 683 cases, 379 are described as cervical, and 282 as of the portio.

On the other hand, Hofmeier reports that of 445 uterine cancers, 236 sprang from the portio, and only 181 from the cervix.

Probably much of the diversity here apparent, is due to surgeons applying the terms 'cervix' and 'portio,' to anatomical structures that are not identical.

The Primary Neoplasm.

It seems certain that the immense majority of uterine cancers arise from the glands of the cervix and their aberrant extensions—whether congenital or acquired—and the reader is referred to Chapter IV., for an account of the histogenesis of the disease.

In cylinder-celled cancer, the initial manifestation usually is a small nodule in the mucosa; rarely, it takes the form of an erosion, or of a deep-seated infiltration. At a later period, the initial nodule is found to have assumed the form of a more or less projecting, flattened, bossy or fungoid excrescence; and it is still quasi-circumscribed (Fig. 42). Cancerous

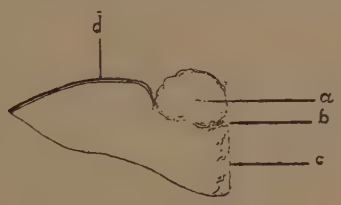

FIG. 42.—GLANDULAR CANCER OF THE PORTIO IN THE EARLY STAGE. (RUGE AND VEIT.)

a, Cancer nodule; *b*, os externum; *c*, canalis cervicalis; *d*, epidermoidal covering of the portio.

tumours of this kind are elastic in consistence, friable and of great vascularity; but they seldom attain large size.

By the continuous centrifugal extension of proliferous epithelial processes, derived from the growing margin of the neoplasm, such tumours increase in size; and, at the same time, they become intimately united with the adjacent structures. In their genesis and subsequent development, these epithelial offshoots repeat the various stages of the initial morbid process. Where the tissues of the uterine wall come into contact with the advancing neoplasm, they are interpenetrated by its ingrowing processes, which spread with special facility along the lymphatics and perivascular sheaths. The extent to which this takes place is variable, some growths manifesting a tendency to burrow from the first;

while, in others, the tendency is rather to project from the free surface (Figs. 43 and 44). Such growths form succulent masses, of whitish, pale yellowish or pinkish aspect, elastic in consistence, very friable and of great vascularity.

When the disease burrows in the cervical wall, it causes a tumid and indurated condition of the part, which is very noticeable on vaginal examination (Fig. 45).

FIG. 43.—GLANDULAR CANCER OF THE CORPUS, FORMING A POLYPOID TUMOUR. (RUGE AND VEIT.)

Two small subperitoneal myomata, quite independent of the cancerous tumour, are seen at the fundus.

Blocking of the veins and consequent venous engorgement, is also an important factor in the production of this tumidity, especially in the uninfiltrated parts of the organ and their vicinity.

The effect produced by the neoplasm on the invaded tissues, is to cause their destruction by pressure atrophy. In this way the disease spreads in the uterine walls; and in

the cervix the entire circumference is often involved. Under these circumstances, the tumidity may occasionally be so considerable, as to occlude the cervical canal; whence fluids may collect within and distend the uterus (pyo- and hæmato-metra) and tubes (hydro-, hæmato-, and pyo-salpinx).

The freshly cut surface of such growths generally presents a solid, succulent aspect; but neither hardness, nor 'cupping' is noticeable, on account of the scantiness of the stroma, on the presence of which these properties depend. A creamy

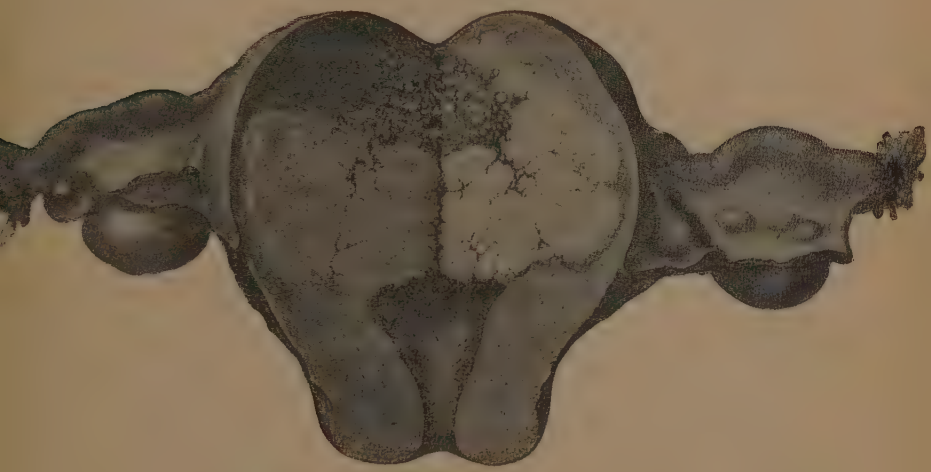

FIG. 44.—GLANDULAR CANCER OF THE CORPUS, SHOWING INFILTRATION OF THE UTERINE WALL, WITH NODULAR DISSEMINATION IN THE LEFT BROAD LIGAMENT, AND IN THE LEFT ROUND LIGAMENT. (KELLY.)

juice exudes, or can be expressed, from the surface of the section. This is the so-called 'cancer juice,' which consists of morbid epithelial cells in an albuminous fluid. Yellowish, opaque patches—most abundant in the central and older parts of the growth—are always noticeable, owing to degenerative changes. Sometimes considerable areas are thus affected, as in the 'pultaceous cancers' of Cruveilhier. Divided bloodvessels are fairly numerous, but cysts are hardly ever seen. The recently formed peripheral parts of such neoplasms, often present a semi-translucent aspect.

Uterine cancers are exceedingly prone to ulcerate, although this process seldom supervenes until the disease has run about half its course; deep irregular excavations are thus produced (Fig. 45). The edges of these cancerous ulcers are very vascular and friable; hence, the examining finger almost inevitably breaks them down, and so causes hæmorrhage. This is an important diagnostic indication, for most other diseases of the cervix—likely to be mistaken for cancer—

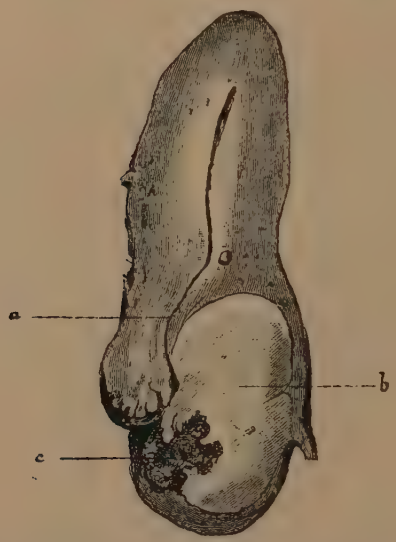

FIG. 45.—MEDIAN SAGITTAL SECTION OF THE UTERUS, SHOWING A CANCEROUS GROWTH IN THE POSTERIOR WALL OF THE CERVIX. (J. WILLIAMS.)

a, Os internum; *b*, cancerous tumour; *c*, commencing ulceration.

seldom react in this way. According to Broca, the facility with which the slightest manipulation causes hæmorrhage in these cases, is due to the fact, that the exposed cancerous *surface* is covered with fine capillaries, which are easily ruptured. In a small proportion of cases the neoplasm never ulcerates.

The microscopical examination of sections of uterine cancers, reveals irregular congeries of large tubular structures, distended to various irregular degrees with epithelial cells, embedded in scanty fibrillar stroma (Figs. 46 and 47).

These structures branch and anastomose irregularly, and they are seen cut in diverse planes.

Within most of them a small lumen can be made out (Fig. 46), but not infrequently they are solid (Fig. 47). Small, polypoid, epithelial excrescences sometimes project

FIG. 46.—SECTION OF A GLANDULAR CANCER OF THE UTERUS. Highly magnified. (CORNIL.)

a, Lumen in the midst of multi-laminated cancer cells, of which the peripheral ones are cylindrical; *b*, an ingrowing cancerous bud; *c*, connective tissue of the stroma; *d*, glandular cul-de-sac, with the epithelial lining becoming multi-laminar, but otherwise not much modified; *m*, *g*, glands dilated and in various stages of modification; *v*, *f*, bloodvessels from the stroma entering epithelial buds.

into the lumina. The cells of the cancerous tubules are multi-laminated, the peripheral ones being of columnar type, arranged perpendicularly to the surface of implantation, as in the normal uterine glands. The rest of their cells are of various irregular shapes and sizes, most of them being polyhedric or quasi-flattened (Fig. 47).

Rarely the cancerous tubuli are lined by but a single layer of columnar epithelium, as in the so-called 'malignant adenoma.'

According to Cornil, the cancer cells are devoid of cilia, even when these exist in their physiological prototypes; whereas, in the various phases of 'glandular endometritis,'

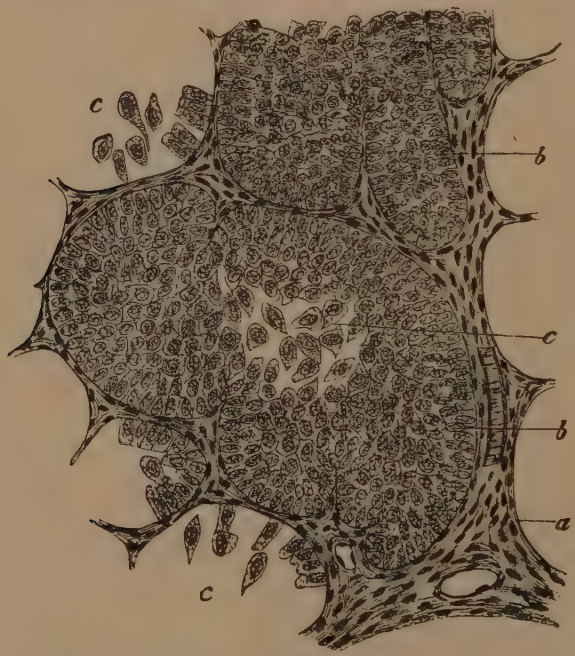

FIG. 47.—SECTION OF A CYLINDER-CELLED GLANDULAR CANCER OF THE UTERUS. Highly magnified. (ZIEGLER.)

a, Stroma; *b*, cancerous glandular masses, without lumina, showing the cylindrical shape of the peripheral cells; *c*, isolated cancer cells.

the cilia—if present in the normal cells—are still retained. Moreover, cancer cells are more easily detachable, than their congeners of the normal glands; hence, in cutting sections of uterine cancers for microscopical examination, great care must be exercised lest they fall out. Probably this is owing to disruption of the protoplasmic filaments ('ponts intercellulaires'); which, as Barfurth has shown, knit together the epithelial cells of the normal mucosa.

In their entirety, the cancerous cells form branching, racemose masses, ingrowing into the surrounding stroma. By serial sections of such tumours, after the manner adopted by embryologists, Hauser has lately demonstrated that the appearance of closed alveoli is deceptive; the spaces that appear to be such, are really nothing more than sections of the branching epithelial ingrowths, which are directly continuous with the glandular structures, whence they arose.

Such tumours increase in size, by the continuously progressive ingrowing of the budding epithelial masses. Altogether the pathological appearances present striking resemblance to those seen, during certain stages of the development of the cervical glands, of which they may be regarded as a modified superinduced repetition.

The cancer cells are evidently, but the slightly altered descendants of the epithelium of the affected utricular glands; and, in many cases, the various transitional stages, from healthy glands to cancerous tubuli, can be distinctly made out.

Waring has demonstrated the important fact, that the constituent cells of cancers of the stomach and pancreas produce the same ferments—pepsin, trypsin, etc.—as the normal secretory cells of these organs.

Similarly, cancers of the cervix uteri may be expected to yield indications of the presence of substances identical with the cervical mucus; and, in this respect, they will probably be found to differ from cancers of the corpus. As tending to confirm this expectation, it may be mentioned that Cornil and others have observed, in the constituent cells of cervical cancers, indications of mucoid or calyciform changes, similar to those that are so characteristic of the epithelium of the cervical glands, during the elaboration of their peculiar secretion.

Thus, it is chiefly on account of the greatly increased numbers of their constituent cells and their multi-laminar arrangement (whence the great size of the cancerous tubuli), of the disorderly grouping of the cells, and of the relatively imperfect degree of organisation attained; that cancerous tubuli differ from normal utricular glands. Neither blood-

vessels nor nerves are found within the former, any more than they are within the latter; and the precise relation of the lymphatic radicles to both sets of structures is still undetermined.

The essential factor underlying the increase of cancerous neoplasms, is the continuous growth and proliferation of their constituent epithelial elements. The pathological cells multiply, like their physiological prototypes, chiefly by indirect nuclear division; and the similarity extends even to the details of karyokinesis—equatorial plates, achromatic spindles, etc. Thus the component cells of a cancerous tumour, are the direct descendants of the primary neoplastic cells.

It has been stated that the latter, by a kind of spermatic influence, infect adjacent cells; and so excite in them morbid action similar to their own. This conception appears to me, to be based upon complete misunderstanding as to the true nature of spermatic influence; and the appearances actually observed afford it no support.

In studying pathological neoplasia, much importance attaches to nuclear changes; because recent biological research indicates, that there can be no cellular growth or multiplication without nuclei. Nussbaum and Grüber assert that, when unicellular organisms are divided, only the fragments containing nuclei continue to grow—the others die.

The nuclei of cancer cells are larger, richer in chromatin, and they more frequently originate karyokinetic figures, than their physiological prototypes. More than a single nucleus is commonly present; and the nuclei often shed their chromatin into the surrounding protoplasm, as a sort of preliminary to division; whereby the so-called giant cells of cancer arise. Hypo- and hyper-chromatic conditions of the nucleus are frequently met with.

Asymmetrical and multipolar mitoses also occur with undue frequency; and the axis of cellular division is often displaced from its normal plane. Moreover, abortive mitoses are not uncommon. Nuclear fragments, detached during mitotic changes, probably originate the 'corps colorables' described by Foà and others.

Such conditions are most marked, where the disease is in active progress. Vacuolation also is of common occurrence.

It was formerly thought, that changes of this kind were specially characteristic of cancer; but, it is now known, that similar conditions are met with in the growing parts of sarcomatous and even of non-malignant neoplasms. In the process of repair after wounds, similar changes are noticeable. Moreover, the experiments of Pierallini and D'Arcy Power, as to the effects produced by irritation upon living tissues, show that in consequence of such artificial stimulation similar conditions ensue.

Taken in their entirety, these deviations from the normal, are but the morphological expressions of a high degree of reproductive activity, which is an essential characteristic of cancer cells. This phenomenon seems to me to be of the same nature—in exaggerated degree—as the accelerated proliferation of epithelial cells, noticeable in the process of repair of wounded epithelial surfaces. Just as this exceeds the physiological rate of increase, requisite to maintain the normal status, so the former exceeds the latter; but I believe all these manifestations belong to the same order of events. The wonderful reproductive activity of cancer cells, enables us to understand how a single cell of this kind, may be the germ of a large tumour—even the largest. It is chiefly in this respect, that cancer cells differ from normal epithelial cells. In their young state as Klebs, Waldeyer and others have observed, both possess contractile and locomotive properties.

Cancer cells are short-lived, for they are soon overtaken and destroyed by fatty, caseous, mucoid and other degenerative changes. Colloid metamorphosis is most exceptional; and it is very rarely that pigment forms in the cells.

It has occasionally been noticed, that the cells from calcareous concretions, analogous to the psammomatous bodies, are sometimes met with in the otherwise normal placenta ('carcinoma psammosum').

Leucocytes are often found between closely approximated cancer cells, and even within them—especially in inflamed

areas; and this has been interpreted as an indication of phagocytosis. Thus, it is chiefly on account of the greatly increased numbers of their constituent cells, of their disorderly grouping, of the comparatively imperfect degree of development attained, and of their less stable vitality, that cancer structures differ from their normal prototypes.

In addition to the foregoing, attention has lately been directed to the presence of certain rounded, hyaline, spore-like bodies within uterine cancer cells. These are commonest where the cancerous growth is most active, which is usually at the periphery. They are generally regarded as the outcome of degenerative changes, etc.; but V. Müller and others maintain that they are parasitic protozoa. Cornil and Doria have met with similar intracellular bodies in 'glandular endometritis,' and they have been detected by others in various non-cancerous diseases; so that, whatever their significance may be, they are evidently not specific cancer microbes.

The presence of various *non-specific*, pathogenic microbes in primary and secondary cancerous growths, has been shown by many observers to be of common occurrence. Bodies like yeast fungi (blastomycetes) are also often present. These were first described by Russell, who regarded them as specific cancer microbes; this interpretation has lately been revived by Sanfelice, Roncali, Braithwaite, and others, but no evidence of any value has been adduced as to their ætiological significance. Cancerous tumours are so rich in saccharine matters, that they form a good habitat for yeast fungi.

The characteristics of the stroma of cancerous tumours, are chiefly determined by the pre-existing structure of the affected part.

Thus, the stroma of uterine cancers consists of scanty fibrillar connective tissue, rich in small round cells having large nuclei (lymphocytes), like those met with in the normal uterine mucosa; which it further resembles, in that it often contains unstriped muscle cells.* Hence little or no gelatine is found in uterine cancers.

* Liebmann, Condamin, Paviot and Bérard have described instances in which the muscular element was so much developed, as almost to constitute a special form of the disease.

Emigrant white blood corpuscles (leucocytes), are also frequently met with in the stroma; as well as the ordinary fusiform and stellate connective-tissue cells. The stroma is probably largely of new formation, being developed from the small round-celled interglandular tissue, that is so abundant in the normal mucosa. In the rare variety of the disease called 'carcinoma myxomatodes' the stroma does not evolve beyond the myxomatous stage. Calcification of the stroma is decidedly rare; and I am not aware that chondrifying or ossifying elements have ever been found in it, although there are good reasons for believing that such may occasionally exist.

The mucosa of a cancerous uterus is never in a healthy condition. As a rule it is markedly thickened; and lately a great deal of attention has been given to ascertain the nature of this thickening, which may assume a spongy, fungoid or villous aspect—with the formation of distinct mucous polypi in some cases. Histological examination reveals hyperplastic lesions, similar to those met with in the so-called 'chronic glandular endometritis,' the stress of the morbid process usually falling on the glands. It is, however, in no sense an inflammatory lesion, either in its nature or in its origin; although it may of course be complicated by superinduced inflammatory conditions. After a time, the musculature also becomes hypertrophied.

Heidenhain has demonstrated the occurrence of analogous lesions in breasts affected with cancer; and, conditions of this kind, probably exist in all parts of the body, in which cancer forms.

Much interest attaches to the question, as to whether these lesions are antecedent to, or consequent on, the development of cancer? In exposed parts, such as the buccal cavity—where the various stages of the process can be observed—the outbreak of cancer is often preceded by obvious hyperplastic changes (leucoplasia, ichthyosis, etc.) in the surface epithelia; moreover, lesions of this kind are seldom limited to the precise starting-point of the cancerous disease.

From this it may be inferred, that a similar sequence also holds good for the development of the disease in parts like

the uterus and breast, where the chain of events cannot be submitted to such direct observation. Hence we may conclude; that the epithelial hyperplasia, which at a given spot culminates in cancer, affects also in a less degree the adjacent epithelia of the region for a considerable extent; in short, there is regional, as well as local, predisposition. It is only to hyperplastic lesions, such as these, that the term 'precancerous' can in any sense be properly applied.

Parts in this condition are evidently more prone to originate cancer, than perfectly normal structures. Hence it seems

FIG. 48.—DIFFUSE CANCER OF THE CORPUS UTERI, SHOWING ITS VILLOUS ASPECT. (RUGE AND VEIT.)

The cervix is unaffected; from its upper part a small mucous polypus projects.

not unreasonable to ascribe the origin of most multiple primary cancers; as well as of most *late* regional recurrences, to changes thus originating.

It is probable that most **diffuse** mucosal cancers arise, as the exaggerated outcome of similar lesions. In this variety of the disease—which is rare—the whole mucosa may be affected; or the morbid condition may be limited to the corpus. It usually presents as a softish, flattened new formation, of shaggy, villous or fungoid aspect; and the musculature is

generally more or less encroached upon (Fig. 48). The disease is of mucosal origin; and its histological features are similar to those of the ordinary form of uterine cancer. Lancereaux has described an instance in which the whole of the uterine mucosa, as well as that of both tubes, was invaded by this form of cancer.

Local Dissemination.

As the primary growth increases in size, it invades the musculature, and subsequently the parametrium. In the cervix, the disease manifests marked tendency to spread downwards, forwards and outwards, towards the anterior vaginal wall and the base of the bladder, rather than in other directions, probably owing to the greater freedom of the lymphatic channels along these lines; and the upper part of the vagina is almost invariably invaded. In the corpus, the tendency of the disease is to spread towards the peritoneum; but it progresses slowly, the musculature often becoming greatly thickened, so that the uterus may acquire an enormous size.

At a comparatively early stage, there may usually be found in the vicinity of the primary neoplasm, or even at some distance from it, small satellite nodules, which are the first obvious signs of regional dissemination. Upon histological examination, these are found to consist of solid plugs of cancer cells, vegetating within the lymphatic vessels, the intima of the latter taking no part in the morbid process (Fig. 49). According to Seelig, these plugs arise from epithelial elements, detached from the primary neoplasm; and conveyed to their new destination by the lymphatics, especially by the perivascular lymphatics. It is mainly through the spread of the disease from the latter, to the adjacent bloodvessels—especially the veins—that these are eventually implicated in a similar way. It is probable also—as Leaf has lately pointed out—that there are many direct communications between the lymphatic and venous radicles, through which the disease may disseminate from the one to the other system.

By virtue of their own powers of spontaneous movement, the cancer cells probably assist in this migration.

The structure of these local dissemination nodules, is almost identical with that of the primary neoplasm whence they

FIG. 49.—SHOWING THE SPREAD OF CANCER WITHIN A LYMPHATIC VESSEL. (SEELIG.)

l, A lymphatic vessel containing a cancerous thrombus; the endothelium is normal; *e*, *e'*, *e''*, a larger cancerous thrombus within a dilated lymphatic vessel; at *e* the endothelium is detached both from the wall of the lymphatic vessel, and from the surface of the cancerous mass; at *e''*, the endothelium is adherent to the surface of the cancer, and detached from the lymphatic vessel. The endothelium is seen to be quite unaffected by the morbid process. Numerous lymphocytes are shown in the surrounding stroma.

originate; and they constitute fresh centres of the disease, which progress precisely as the latter.

It is generally believed that cancer of the uterus tends to remain localised, longer than cancer of most other organs; but on this subject there has been much exaggeration. In

fatal cases that have run their entire course without interruption, I have almost invariably found more or less local dissemination. Leopold's researches show that, even at a comparatively early stage of the disease, too much reliance must not be placed on this alleged immunity from dissemination; for of 127 cancerous uteri extirpated *per vaginam*, he found dissemination in the parametrium in 68, or in 54 per cent., the disease being limited to the uterus in the other 59 cases. Mackenrodt has arrived at similar conclusions. He found that the ablation of the disease had often been but incompletely effected; for, on microscopical examination of the apparently healthy tissues divided by the surgeon's knife, numerous cancerous foci were revealed.

Invasion of the parametrium causes diminution of the normal mobility of the uterus, and eventually its complete fixation. In cancer of the cervix, owing to this cause, the uterus is nearly always depressed as well as fixed; and thus the vagina appears to be shortened. It would be a mistake to infer, from what has been stated, that cervical cancers spread only in a downward and forward direction; for, in no inconsiderable proportion of cases, the disease extends backwards towards the rectum, especially in the sacro-uterine ligaments; other localities in which dissemination is apt to occur are the ovaries, tubes, broad ligaments, pelvic peritoneum, great omentum and adjacent intestines.

Cervical cancer may also spread upwards and invade the corpus; this need excite no surprise, when we recollect the freedom of the anastomoses between the lymphatics of the two segments of the uterus, and the facility with which retrograde lymph currents are set up. Instances in which the predominant spread of the disease has been in this direction have lately been reported by Bégonin, Tate, Cullingworth and others.

A considerable number of cases of primary cancer of the cervix have now been recorded, in which cancerous foci were also found in the corpus, without there being any obvious alteration of the intervening parts (Fig. 50). Seelig has pointed out, that the communication between the lymphatics of the

cervix and those of the body, is very much freer through the numerous large branches within the musculature, than it is through the much smaller branches, uniting the mucosa of the two uterine segments; and he believes that instances of multiple cancer, such as we are now discussing, are due to dissemination of the disease along these lines, rather than to multiple origin. In a few cases the primary outbreak has been in the corpus, and the secondary one in the cervix;

FIG. 50.—CANCER OF THE CERVIX, WITH DISSEMINATION IN THE MUCOSA OF THE CORPUS. (RUGE AND VEIT.)

most of these are probably also due to dissemination;* but Winter, Niebergall, and others, think that some of them are caused by inoculation of the cervix, through contact with the cancerous disease of the corpus, or with débris given off from it.

As the primary growth extends, it gradually blends with the adjacent outlying nodules; and thus a diffused mass of

* In a well-reported case by Leopold, all the nodules were of identical structure, viz., cylinder-celled glandular cancer; and it was ascertained by examination during life, that the cervix and portio were at first free from the disease.

cancerous infiltration results. In this way, when the inferior segment of the uterus is the part primarily affected, this structure, the anterior wall of the vagina, the base of the bladder and adjacent parts, are glued together; and the infiltration is apt to invade also the peri-urethral tissues (Fig. 51); moreover, in a considerable proportion of cases it spreads backwards, involving the rectum and adjacent structures—including the utero-sacral ligaments.

FIG. 51.—CANCER OF THE CERVIX INVADING THE VAGINA, BLADDER, AND URETHRA. (CRUVEILHIER.)

U, The uterus; Y, the vagina; V, the bladder; X, the urethra; R, the rectum, showing erosions from fæcal retention.

As the disease extends towards the base of the bladder, it surrounds the lower ends of the ureters, compressing them, and destroying their mobility. The precise spot at which this first happens, probably is altogether outside the bladder, where the ureters lie close to the vaginal wall, before they bend forward to perforate the base of the bladder; at any rate, this is what I infer from the not infrequent occurrence of hydronephrosis, in the absence of any cancerous infiltration of the bladder. An impediment is thus offered to the outflow of urine, in consequence of which the ureter, together

with the pelvis of the kidney and its calyces, become distended by the accumulating urine—hydronephrosis.

It sometimes happens that the cancerous tumour obstructs the ureters, simply by compressing them, as in a case reported by Jourdan. The experiments of Lewin and Goldschmidt show the facility with which, even under normal conditions, reflux of urine from the bladder into the ureters may occur; while the least hindrance to the outflow causes it at once, when the bladder is full.

The purely mechanical effect of this hydrostatic compression on the kidney, is to cause atrophic changes in the papillæ, pyramids, and eventually in other adjacent renal structures; but besides this, after a time, interstitial nephritis usually supervenes—indeed, according to Lancereaux, inflammatory changes in the kidney are of invariable occurrence in advanced cases.

Complete obstruction of the ureters is decidedly rare; hence the whole renal tissue is seldom destroyed, and anuria is exceptional. I have seen a case in which the cancerous disease, having invaded the wall of the ureter, spread upwards along it to the pelvis of the kidney; and another case in which the cancerous growth, having perforated the lower part of the ureter, grew upwards within it, to the pelvis of the kidney.

It is highly exceptional for uterine cancers to run their entire course, without inducing hydronephrosis; and the affection is nearly always bilateral.

The extension of ulceration to the base of the bladder, brings with it a dangerous crop of complications, viz., perforation of the bladder, cystitis, ascending ureteritis, pyelonephrosis, suppurative pyelitis and acute interstitial nephritis, with the occasional formation of miliary abscesses. In like manner the rectum may be perforated.

Eventually the remains of the bladder, uterus and rectum, become converted into one large, ulcerated cancerous cloaca; whence profuse putrid discharge issues, causing vaginitis and vulvitis, which sometimes assume a membranous character.

In most cases of uterine cancer, the fatal issue is deter-

mined by some such intercurrent complications as the foregoing, in which uræmia eventually plays a large part.

As the disease spreads towards the peritoneum localised adhesions are formed, matting the pelvic contents together, and so shutting off the advancing cancer from the general peritoneal cavity; but, in spite of this, general peritonitis not infrequently ensues, and in a certain proportion of cases, fatal perforation. In like manner, adhesions often arise between the diseased uterus and the great omentum. Adjacent loops of bowel—usually sigmoid, rectum, or ileum—may also be involved, giving rise to intestinal obstruction, or even to perforation.

Pulmonary embolism is also a complication to be reckoned with.

The relative frequency of the occurrence of the above-mentioned lesions, may be gauged from the following analysis of 78 post-mortem examinations on patients dead of uterine cancer, many of which were made by myself:

The **vagina** was extensively infiltrated in 72 cases, and in 6 cases it was scarcely at all invaded.

The **bladder** was infiltrated in 56 cases, and in 29 it was perforated as well.

There was extensive **renal disease** in every case. The following lesions were met with:—Double hydronephrosis with atrophy in 52 cases; single hydronephrosis with atrophy in 7 cases (in 5 of these the opposite kidney healthy, in 2 diseased); double pyonephrosis in 3 cases; single pyonephrosis (with opposite kidney diseased in all) in 3 cases; hydronephrosis of one side with pyonephrosis of the other in 2 cases; double chronic interstitial nephritis in 3 cases; acute nephritis of one kidney, with chronic nephritis of the other in 1 case; and 1 case each as follows—renal cysts (large), cystic adrenals, deposit of urates. In most of these cases there was concomitant nephritis; and in 15 cases there were also signs of acute cystitis. In 11 cases hydronephrosis was present although the bladder was quite free from cancerous disease. Notwithstanding the frequency and severity of the renal lesions, general dropsy was seldom met with.

The **rectum** was infiltrated in 19 cases, and in 10 it was perforated as well.

The **pelvic contents** were matted together by adhesions in 34 cases, causing **intestinal obstruction** in 3 cases, as follows:

(1) There were 2 exceeding small constrictions of the gut, 1 at the ileum—6 inches above the ileo-cæcal valve—and the other at the sigmoid flexure of the colon; both due to adhesions of the gut to the diseased uterus.

(2) Body of uterus enormously enlarged and infiltrated with cancer, compressed rectum against sacrum.

(3) At the brim of pelvis, sigmoid flexure of colon was constricted, twisted, and adherent to the left ovary, which was cancerous. In this case the rectum also was compressed—to a certain extent—by the uterine growth, which had invaded its anterior wall.

In 10 of these cases there were, as well, old peritoneal adhesions throughout the whole abdominal cavity.

There was acute general peritonitis in 8 cases, ascites in 1 case and effusion of chyle in 1 case.

In 13 cases the **pelvic peritoneum** was cancerous—Douglas' pouch in 7, general in 6, anterior cul-de-sac in 2 cases; 4 of these cases had perforated into the peritoneal sac, and so caused fatal peritonitis.

The pelvic bones are rarely attacked; but I have met with a case of this kind, and so has Winckel.

The **ovaries** were invaded in 13 cases (both in 8, the left in 4, and the right in 2 cases).

In the **broad ligaments** there were cancerous deposits in 5 cases.

Kiwisch found the **tubes** cancerous in 18 out of 73 necropsies.

Pyometra was met with in 3 cases; **pyosalpinx** in 5 cases (double 4, single 1)—one of which ruptured into the peritoneal sac; and **hydrosalpinx** in 2 cases.

In operative procedures for uterine cancer, it is important to recollect the frequency with which the disease disseminates in the ovaries, tubes and broad ligaments; and when the disease originates in the fundus or its vicinity, dissemination along this track is of special frequency (*q.v.*, Fig. 44).

Lymph-Gland Dissemination.

Before proceeding with the study of the dissemination of uterine cancer in the lymphatic glands, it seems desirable to give a brief résumé of our knowledge of the uterine lymphatic system, which has much advanced of late, thanks to the researches of Poirier, Sappey, Wallich and Hoggan.

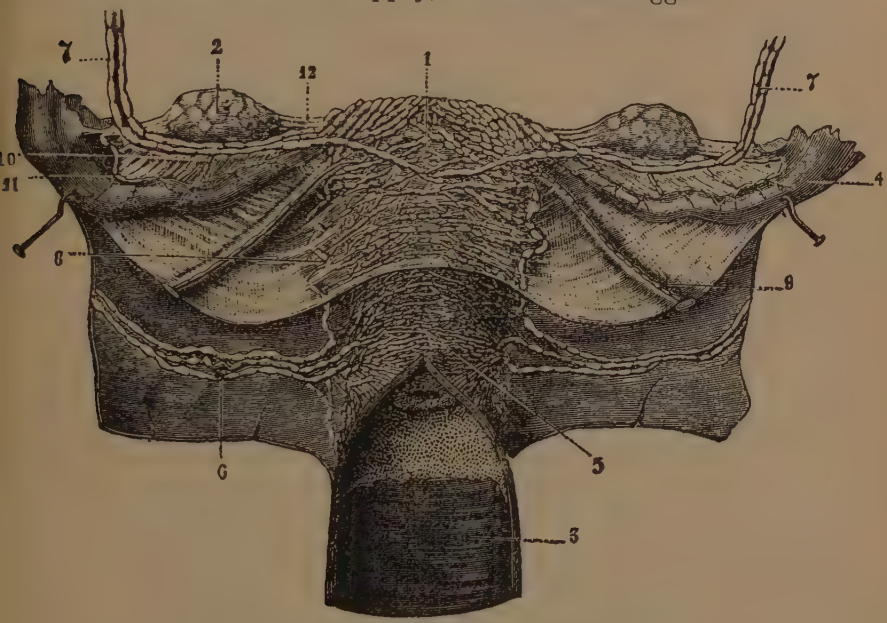

FIG. 52.—THE LYMPHATICS OF THE UTERUS. (POIRIER.)

1, Lymphatics from the body and fundus; 2, from the ovary; 3, from the vagina; 4, from the Fallopian tube; 5, the cervical lymphatics; 6, the collecting trunks of the cervical lymphatics on their way to the ilio-pelvic glands; 7, collecting trunks from the body and fundus going to the lumbar glands; 8, anastomosis uniting the vessels of the neck and body of the uterus; 9, a lymphatic vessel proceeding from the fundus of the uterus—along the round ligament—to the inguinal glands; 10, 11, lymphatics from the Fallopian tube, joining the large trunks from the uterine body; 12, the ovarian ligament.

These show that the uterus is exceedingly rich in lymphatics, whose numerous branches communicate freely with one another, as well as with offsets from adjacent organs (Figs. 52 and 53). Owing to the inefficiency of the valvular

apparatus, lymph-currents are readily established in directions other than the normal. Hence, the whole system may usually be injected by inserting the syringe into almost any part of the organ; hence also, in cancer, we need not be surprised to meet with dissemination in localities, not directly in the course of the normal lymph-stream.

It is probable also, as previously mentioned, that there are communications between the lymphatic and venous radicles, through which cancer may disseminate.

The mucosa is permeated throughout with lymphatic channels; but the precise manner in which they originate, and their exact relation to the utricular glands, has not yet been definitely determined. Leopold regards the stroma of the mucosa, as consisting of an intercommunicating system of lymph spaces, in which the glands, etc., are embedded; the small round-celled interglandular elements, he considers to be lymphocytes.

From the mucosa, efferent branches pass to the musculature; which encloses an immense number of large clefts and sinuses, freely communicating.

From this source, branches are given off in great numbers, which emerge on the surface of the uterus, beneath the peritoneum; where they ramify and anastomose in the subperitoneal connective tissue (Figs. 52 and 53). These vessels communicate freely with the subendothelial lymphatic plexuses of the peritoneum.

Hoggan describes the lymphatics of the musculature as consisting of closely-packed, sacculated, valved sinuses, capable of undergoing great elongation and distension. He considers that the so-called subserous lymphatics, are but subtending twigs and diverticula, from the branches in the musculature. Between the mucosa and muscularis he has met with large bursa-like lymphatic spaces. The utricular glands are closely associated with the subepithelial lymphatics 'like so many leeches.'

The lymphatics of the corpus, cervix and portio communicate by numerous anastomoses, which are especially free within the musculature, and along each lateral border

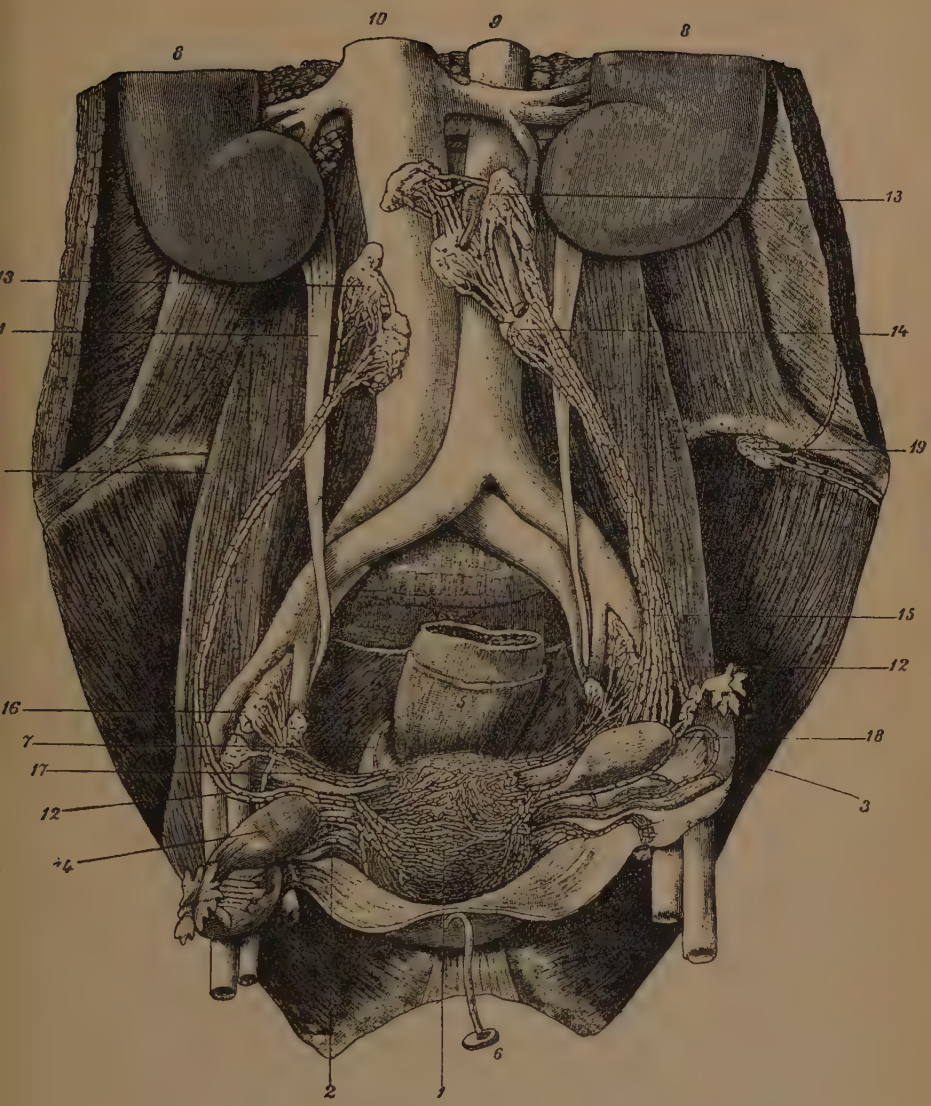

FIG. 53.—THE LYMPH SYSTEM OF THE FEMALE PELVIC ORGANS. (POIRIER.)

1, Uterus; 2, round ligament with its lymphatics; 3, Fallopian tube; 4, ovary; 5, rectum; 6, bladder; 7, utero-sacral ligament; 8, kidney; 9, abdominal aorta; 10, vena cava; 11, ureter; 12, lymph vessels going to—13, lumbar glands; 14, lumbar glands receiving the ovarian lymphatics; 15, ovarian lymph vessels; 16, iliac and hypogastric lymph glands receiving lymphatics from the cervix uteri; 17, lymphatics of cervix uteri; 18, lymphatics of the Fallopian tube; 19, lymph gland of the abdominal wall.

of the uterus; while inferiorly they are joined by vaginal offsets (Fig. 52).

The efferent branches from the corpus converge to form two large trunks on each side, which then enter the upper part of the broad ligament with the utero-ovarian blood-vessels; they pass thence beneath the ovary to the upper border of the broad ligament, where they are reinforced by numerous branches from the ovary and tube, which anastomose with them higher up; thence they follow the course of the utero-ovarian bloodvessels to their termination in the lumbar glands (Figs. 52 and 53).

The latter consist of median and lateral chaplets of ganglia, with numerous intercommunicating branches, which completely surround the aorta and vena cava. They extend from the receptaculum chyli above, to the angle of bifurcation of the common iliac artery below, where they become continuous with the iliac glands. The lowest lumbar gland, which receives lymph directly from the corpus uteri, is situated on a level with the inferior extremity of the kidney; those next higher up get ovarian as well as uterine lymph. Cancerous enlargement of these glands, by compressing the aorta or vena cava, may cause interference with the circulation through these vessels.

Some lymphatics from the corpus uteri, go with the round ligament to glands in the groin, as described long ago by Mascagni. This explains one mode of dissemination of uterine cancer in these glands (Fig. 52).

The adhesions, so common between the uterus and adjacent parts—especially posteriorly—are rich in lymphatics, which communicate with those of the uterine peritoneum.*

Efferent branches from the cervix emerge at numerous points of its surface, and anastomose in the peri-uterine tissue, gradually forming larger and larger vessels; which, after being joined by several offsets from the portio and

* Poirier says: 'I have examined the genital organs of more than 300 subjects, mostly of advanced age, and I can testify that a healthy uterus, *i.e.*, one quite free from adhesions due to antecedent inflammation, is rare —quite exceptional in fact.'

upper part of the vagina, converge to form two or three large trunks on each side of the cervix.* These pass transversely outwards, with the uterine bloodvessels, along the inferior border of the broad ligament, towards the lateral wall of the pelvis; thence they proceed upwards and backwards to the upper ganglia of the ilio-pelvic glands (Figs. 52 and 53).

The latter are a continuation downwards of the lumbar chain. Their highest ganglia are situated in the angle of bifurcation of the common iliac artery, in close proximity to the external iliac vein, either of which vessels may be compressed by their enlargement. These ganglia are on a level with the upper part of the pelvis, in the vicinity of the sacro-iliac synchondrosis. Thence communicating branches dip into the pelvis; whence the chain is continued downwards, in front of the internal iliac (hypogastric) artery on each side. It is the three upper glands of this series that—according to Poirier—receive the cervical lymphatics; and when enlarged they can be felt *per vaginam* or *per rectum*, by deep palpation directed upwards and outwards, close to the lateral borders of the uterus.

The next succeeding glands of the series are situated over the great sacro-sciatic foramen, in close proximity to the great sciatic nerve, which may be compressed by their enlargement—under these circumstances they can readily be felt on digital examination *per rectum*. Poirier describes these glands as receiving lymph from the upper and middle parts of the vagina; but, according to Cruveilhier, these are the glands usually affected in cancer of the cervix, and they are often the only ones implicated.

A continuous chain of ganglia extends from the ilio-lumbar series, along the iliac bloodvessels to the crural canal; and by this route also the disease may reach the inguinal glands. The latter glands may also be directly involved, when the disease reaches the anterior part of the vagina.

* Championnière says: 'I have seen often, and I have had it drawn, a gland placed at the side of and behind the cervix, above the lateral vaginal cul-de-sac.' Neither Poirier nor Sappey could find such a gland; but what really exists in this situation is a contorted mass of anastomosing lymphatics from the cervix.

Peiser describes some of the cervical lymphatics, as passing backwards in the sacro-uterine ligaments to the posterior pelvic wall, there to terminate in the lateral sacral glands, near the bifurcation of the common iliac veins (Fig. 53, 7).

In the vicinity of the obturator foramen (Le Bec), and in the subpubic region, one or more ganglia may occasionally be found, which communicate with the foregoing; and in cases of uterine cancer these may exceptionally be indirectly infected.

Although a considerable number of uterine cancers run their entire course, without causing any obvious dissemination in the adjacent lymph glands, yet it would be a mistake to suppose that lymph gland dissemination is rare in uterine cancer; for, as a matter of fact, the adjacent glands are invaded in the great majority of post-mortem cases. Thus of my 78 necropsies, lesions of this kind were noted in 56, or in nearly 72 per cent. In 28 per cent., however, there was no obvious glandular affection. In mammary cancer, under like circumstances, as I have pointed out in my work on 'Diseases of the Breast,' lymph gland dissemination is of almost invariable occurrence. Hence it is evident, that lymph gland dissemination is of less frequent occurrence in uterine, than in mammary cancer.

Several glands are usually involved. The first to be affected are those that receive their lymph directly from the part of the organ invaded by the primary disease, and the subsequent spread of the disease from gland to gland corresponds to the course of the lymph-stream; but it must be borne in mind, that each infected gland constitutes a fresh centre of dissemination.

These secondary growths are similar in structure and character to the primary neoplasm; and it seems certain that they owe their origin to the latter, through the agency of detached cellular fragments carried off by the lymphatics.

There are good reasons for believing that the majority of these 'cancer emboli' perish and are absorbed, owing to the phagocytic activity of the lymphocytes of the glands, and that only those with sufficient vitality to overcome this

resistance, originate dissemination tumours. Thus the lymph glands form a temporary barrier to the spread of the disease, and are not themselves usually affected until a considerable time after the primary outbreak.

In cervical cancer, the ilio-pelvic group of glands are more frequently invaded than any others; there was dissemination in these glands in 44 of my cases, or in 56 per cent., and in 20 of them the pelvic glands alone were involved.

In a case, reported by Chapuis, owing to compression of the right internal iliac artery by a cancerous gland, and consequent thrombosis of the common iliacs, dry gangrene of both lower limbs set in.

In seven of Lebert's forty-five uterine cancer necropsies, œdema of one or both lower limbs was met with, owing to cancerous glands pressing on the iliac veins. Lymphœdema, owing to obstruction of the lymph circulation, is a very rare occurrence.

It is also very exceptional to find only the lumbar glands affected; my list contains but two instances of this kind; but these glands are often involved by upward extension of the disease from the ilio-pelvic group, as in twenty-four of my cases.

There was dissemination in the inguinal, as well as in the ilio-pelvic glands, in six cases (both sides four, right side two); and, in three other cases, the mesenteric ganglia were also invaded. The disease has even been known to have involved as well, the posterior mediastinal glands; and the receptaculum chyli.

As evidence of the rarity of dissemination in the adjacent lymph glands, in the early stage of the disease, reference may be made to the fact; that, in extirpating cancerous uteri, surgeons have seldom met with infiltrated glands; moreover, after extirpation, glandular recurrence is decidedly rare.

According to Winter, lymph-gland dissemination is present in from 20 to 30 per cent. of all uterine cancer patients, seeking surgical relief; but Peiser estimates the proportion at 50 per cent.

Local and lymph-gland dissemination, is of slower and less

frequent occurrence, in cancer of the corpus, than in cancer of the cervix; hence, the proportion of cases suitable for operation, is relatively greater in the former than in the latter.

Troisier and others, have lately called attention to some remarkable lymph-glandular affections ('adénopathies externes à distance'); that occasionally arise in the course of certain cancers, especially those that are intra-abdominal.

In this condition, some of the superficial glands at a distance from the primary disease, become enlarged, without any of the intervening structures necessarily being invaded. The glands usually thus affected, are those of the left supraclavicular region; but, quite exceptionally, the right supraclavicular, inguinal, axillary, epitrochlear or other glands may be involved. These may be affected conjointly with the supraclavicular glands, or as isolated manifestations. Of thirty-seven supraclavicular adenopathies tabulated by Rousseau, in twenty-nine the glands on the left side were affected; in four those on the right, and in four those of both sides.

In the great majority of these cases, we have to do with cancerous dissemination; but, I have witnessed retrocession, and so has Girode. At first, only a single gland is usually involved, then others of the group become affected, and these agglomerate. Pressure symptoms are comparatively rare, but I have seen an instance in which an affection of this kind, caused œdema of the upper limb. It is usually a late symptom; and this probably accounts for the absence of ulceration and suppuration. Many cases have been noted in connection with cancer of the uterus (Troisier, Faidherbe, Petit, etc.); but, in most cases, the stomach is the seat of the primary disease. It seems probable, that this curious pathological condition is due to regurgitation of lymph—charged with cancer cells—from the thoracic duct, into the adjacent cervical glands; which lymph—in the case of uterine cancer—is presumably conveyed to the thoracic duct, by lymphatics derived from infiltrated lumbar glands. It accords with this, that the presence of cancerous emboli within the thoracic

duct, in cases of uterine cancer, has been noted by Unger, Troisier, Cruveilhier and others.

Although usually a late symptom, instances are on record, in which this adenopathy has supervened at least two years before death.

I need hardly insist on the importance of this 'manifestation' as a contra-indication to operation; and as an element in the diagnosis of obscure intra-abdominal disease. It should be borne in mind, however, that tubercle, syphilis and a few other morbid conditions, may occasionally produce somewhat similar adenopathies; moreover, this affection must not be confounded with the 'pseudo-lipôme sus-claviculaire' of Verneuil, which is simply an overgrowth of the fibro-fatty tissue of the supraclavicular fossa—both sides being usually affected—those most liable being middle-aged women otherwise in good health.

In a certain proportion of these cancerous glands, the disease is complicated by the supervention of inflammation and suppuration; owing, as Zahn and others have shown, to their inoculation with pyogenic microbes, detached from the primary neoplasm, with the original 'cancer emboli.'

General Dissemination.

The appearance of cancerous growths in various parts of the body, remote from the primary disease and its derivatives (so-called 'metastases'), is one of the most striking features of the disease. It is remarkable that the cancers of every locality, have their own special modes of dissemination; and even the various forms of the disease, in particular organs, manifest differences in this respect.

There can be no doubt that the **uterus** is one of those organs, in which the liability of cancer to disseminate in distant parts of the body, is not very great.

I have met with lesions of this kind in about 20 per cent. of the fatal cases of cervical cancer, that had run their entire course; whereas, I have found that dissemination had taken place—under like circumstances—in 73 per cent. of the cases of mammary cancer.

The probable explanation of this difference is, that uterine cancer patients are commonly cut off by fatal intercurrent complications, before the cancerous disease has had time to mature; for this form of dissemination seldom sets in, until a comparatively late stage of the disease.

In the ensemble of their characters, histological and otherwise, growths of this kind closely resemble the primary neoplasm; and their origin is best accounted for by the 'embolic theory,' according to which the first cancer that appears is the source of all those that follow after. The germs whence these systemic disseminations arise are proliferous cells, detached from the primary neoplasm or its derivatives, and carried off by the blood-stream.

Growths of this kind are usually multiple, several remote parts of the body being affected. They may be met with in almost any part of the organism, the only structures really exempt being avascular tissues like cartilage, cornea, etc. Nevertheless, they occur with much greater frequency in some parts than in others; the lungs, liver, peritoneum and pleura being their seats of predilection.

The following analysis, gives a good idea of the relative frequency with which the various localities are affected, in cancer of the cervix:

Of 79 necropsies, systemic dissemination was found to have taken place in 16, or in 20·2 per cent.

The seats of the disease were:

Lungs (both 6, right 1)	in 7 cases.
Liver	,, 7 ,,
Peritoneum and omentum	,, 4 ,,
Pleura (both 1, right 1)	,, 2 ,,
Skin of chest and abdomen	,, 1 case.
Tibia (right) and innominate bone (right) ...	,, 1 ,,
Heart	,, 1 ,,
Kidney (left)	,, 1 ,,

Metastases have also been found in the stomach, mammæ, brain, adrenals, gall-bladder, dura mater, thyroid, heart, etc.

Dissemination in the bones is rare in uterine cancer; but, in addition to the case included in the foregoing analysis, I

know of instances in which it has occurred in the femur, humerus and ribs respectively.

The following case, in which secondary cancer of the humerus, was mistaken for primary sarcoma of that bone, for which the limb was amputated at the shoulder-joint, presents so many remarkable features, that it is well worth recording here:

The patient, aged fifty-two, was admitted into University College Hospital, on account of painful swelling at the upper part of her right arm, of two months' duration. She complained also of loss of power in the part, which began to weaken about a year previously. On examination, there was found great enlargement of the upper end of the humerus, which extended as far down as the insertion of the deltoid. The overlying skin was reddened, and the subcutaneous veins were much enlarged. There was great loss of power in the limb, and constant 'gnawing' pain was experienced, which extended to the elbow. Passive movements at the shoulder-joint could be effected, but they caused much pain. There was family history of phthisis; and a sister had died of internal cancer. Her previous health had never been good. The swelling was aspirated, but only some blood and fatty matter came away. Under these circumstances, it was resolved to amputate at the shoulder-joint. During manipulation, prior to operation, the bone fractured through the surgical neck. The part was removed by cutting the deltoid flap by dissection, and the internal flap by transfixion. The upper part of the humerus, as far down as the insertion of the deltoid, was found to be involved by a malignant growth; but the cartilage of the head was intact. The wound healed quickly; but the patient's health, nevertheless, progressively deteriorated, and she died about seven months after the operation. Before her demise, it was discovered that she was suffering from ulcerated cancer of the cervix uteri, to which the cancerous tumour of the humerus was evidently secondary. Histologically examined, the latter growth consisted of fibrous stroma containing numerous small spaces, for the most part lined by but a single layer of short columnar cells; but some of the spaces were filled with spheroidal cells. The appearances were similar to those, often met with in cancer of the cervix uteri.

Recurrence.

No feature of cancer has attracted more attention, than that which is known as 'recurrence.' It certainly does seem extraordinary, after everything has been done to insure its destruction—whether by the knife, by fire or by caustics—that the disease should nevertheless so frequently spring up again.

Considering the frequency with which radical operations are now being done for uterine cancer, it is regrettable that the phenomena of its recurrence, have not yet been studied with that precision which is desirable.

It has, however, been clearly ascertained; that, in the immense majority of cases, the recurrent lesions—which are almost invariably multiple—make their first appearance in the locality of the primary disease, or in the region immediately adjacent thereto.

Most observers are agreed that—after partial hysterectomy—it is in the paracervical and paravaginal tissues, adjacent to the extirpated part—rather than in the uterine stump—that recurrent lesions first appear; and, after more radical operations, it is in the adjacent parametrium that the disease first reappears.

Of 58 recurrences, after the extirpation of cervical cancer, Winter found that 54 were in this locality; and Hofmeier reports that of 47 operated cases—in which recurrence took place during the first year after partial vaginal hysterectomy—the disease reappeared in the adjacent parametrium in 45 cases.

It appears to be rare for the initial manifestations of recurrence, to originate in the ilio-pelvic or lumbar glands; but I know of no really satisfactory observations bearing directly on this subject. Winter, however, states that he has never observed a case of the kind; and of forty-four necropsies—after total extirpation of the cancerous uterus—lymph-gland recurrence was found only in two cases.

As to the relative frequency of recurrence in the ovaries, tubes and adjacent parts of the broad ligaments—when these have been left behind—there is also lack of precise information.

So-called metastatic recurrences are extremely rare; for Winter met with only 9 instances, after 202 operations.

The incidence of recurrence, is much influenced by the stage of the disease, at which operative interference is undertaken. Thus, Leopold found that of 59 early operated cases —in which there were no signs of extension of the disease to the parametrium—recurrence took place in 14 or in 23·7 per cent.; whereas, of 68 advanced cases—in which the parametrium was obviously involved—there was recurrence in 45 or in 66·1 per cent. Krukenberg's data are of similar import. Ott reports, that after early vaginal total hysterectomies, 7 patients were still free from any return of the disease, for periods varying from one to over three years after operation, and in only one patient had the disease recurred within one year after extirpation; whereas, after 9 similar late operations, recurrence followed in every case, in periods varying from one to eleven months. These figures show the necessity for early operation.

The incidence of recurrence, is also influenced by the nature of the operative procedures, undertaken for the removal of the primary disease; and probably also by the seat of the latter, for recurrence is reported to be of more frequent occurrence after the extirpation of cervical than corporeal cancer.

The following tabular statement, based on Hache's statistics, shows the periods at which recurrences supervened, after complete vaginal hysterectomy, in 144 cases:

	Per cent.		Per cent.
Under 3 months ...	19·4	12 to 18 months ...	12·5
3 to 6 months ...	18·0	18 to 24 „ ...	9·8
6 to 9 „ ...	10·5	2 to 3 years ...	14·6
9 to 12 „ ...	7·6	Over 3 years ...	7·6

From this we learn, that over 55 per cent. of all recurrences, take place during the first year after operation; and that nearly 20 per cent. of these originate during the first three months. On the other hand, only 7·6 per cent. of recurrences appear after the third year.

Very late recurrences are of much more exceptional occurrence, than very early ones. Pamard has reported an example of the recurrence of cervical cancer, fifteen years after the extirpation of the primary disease by supravaginal amputation, with the galvano-caustic wire snare. The patient was a young woman; and the disease was limited to the posterior lip of the os. The diagnosis was confirmed by microscopical examination.

Fraenkel has seen recurrence eight years after removal of the primary disease, which was squamous epithelial cancer of the portio.

It is most exceptional for recurrence to supervene, after total hysterectomy, at a later period than four years subsequently to the operation; but Leopold reports having met with recurrence first appearing at 8, 7, $6\frac{1}{2}$, and $5\frac{3}{4}$ years respectively after hysterectomy.

In their morphological and other characters, recurrent growths closely resemble the primary neoplasm; hence, it may be inferred, that they originate from the latter or its derivatives, or that both alike spring from the same source—the uterine epithelia. These are in fact the sole sources of recurrent growths. It is significant that the great majority of recurrences are situated either in, or in the immediate vicinity of, the operation wound. The researches of Leopold, Mackenrodt and others, have demonstrated, that fragments of the disease are often left behind, even after total hysterectomy. It seems certain that morbid fragments of this kind, persisting in the parametrium, are the germs whence most recurrences originate. Thus may be explained the initial multiplicity of recurrent growths; wherein they differ so markedly from independent spontaneous outbreaks, which are almost invariably solitary. The great frequency of recurrences soon after operations, points in the same direction. Hence we may conclude, that the immense majority of local recurrences, are due to incomplete ablation of the primary growth. There is really no true reproduction of the disease; but merely continuation of it, in the surviving unextirpated fragments (**continuation recurrence**). Similarly,

when after operation the disease recurs in adjacent lymph glands, or other parts of the body not directly continuous with the primary disease; we may infer that its recrudescence in these situations, is due to the dissemination there of fragments of the primary disease prior to the operation for its removal, which have subsequently developed as in the formation of other dissemination growths.

Hofmeier, Winter, Schopf and others believe, that many of these continuation recurrences are due to the dissemination in the operation wound of cancer elements detached by the surgeon's knife, etc., during the operation. Winter is especially inclined to ascribe to this source, those cases of acute diffuse recurrence in the parametrium, that are sometimes observed after hysterectomy for cancer. While not wishing to overlook the danger of recurrence from this cause, it seems to me more in accordance with the present state of knowledge, to ascribe the origin of most of these recurrences, to the survival of unextirpated fragments of the primary disease in the surrounding parts, rather than to traumatic dissemination.

There yet remain for consideration certain cases of late recurrence—of which I have previously cited several instances—which cannot be explained as continuation recurrences, without resorting to the gratuitous assumption; that fragments of cancer may remain, in a passive state, latent in the tissues for many years, and then suddenly recover their morbid activity.

Some cases of this kind—especially such as supervene after partial hysterectomy—may be due to independent outbreaks of the disease, in unextirpated remains of the mucosa of the part in which the disease originated (repullulation); for, as I have previously mentioned, the mucosal epithelium, in such cases, is always in a hyperplastic (precancerous) condition. This would explain the localisation of most late recurrences in the primarily affected region, rather than elsewhere; and their more frequent occurrence in the vicinity of the operation wound, rather than in the scar itself.

Certain highly exceptional instances of late recurrence, which cannot be satisfactorily explained by any of the foregoing rationales—such as Schmidt's case of recrudescence of cancer in the liver, seven years after extirpation of the primary disease from the breast—are probably due to the lodgment of hyperplastic, precancerous cells — derived from the mamma at the time of the operation—in the liver, where they have subsequently taken on cancerous activity. The experiments of Schweninger, Kaufmann and Ribbert, have demonstrated the vitality of such grafts, and the facility with which they persist and develop.

In like manner, cancer is sometimes seen to arise primarily in the glands of the groin, in association with precancerous lesions of the penis and scrotum. The development of cancer, from cells detached and implanted in the cicatrix of the wounds, made for the removal of non-malignant ovarian cysts, long after the successful completion of the operation, is a phenomenon of similar import. I would suggest an explanation of this kind for those rare instances of late recurrence, after total hysterectomy for uterine cancer; when it is hardly conceivable, that any unextirpated remains of the utricular glands could possibly have been left behind. In these cases, however, the recurrent disease may very well have arisen from non-cancerous epithelial cells, detached during the operation, and grafted in the vicinity. I certainly think this rationale is more in accordance with the known facts, than the alternative one of latent cancer germs, which has no definitely ascertained facts to rest on.

There is still another source whence certain late recurrent growths may occasionally arise; and that is, from aberrant remains of Wolffian or Müllerian structures, which—as recent researches have shown—abound in the peri-uterine tissues.

The Varieties of Mucosal Cancer.

1. Cancers of the uterine mucosa (glandular) that run their entire course within a year, I reckon as of the **acute** variety. Such cases are by no means rare: of my 90 uterine

cancers, 24 were acute, or 26·6 per cent.; whereas only 15·6 per cent. of my mammary cancers proved fatal within this brief period. The morphological characteristics of such growths, are usually identical with those of the ordinary cylinder-celled glandular cancer. In some exceptional cases, however, the morbid epithelial elements, instead of assuming the typical tubular form, have been observed to be irregularly diffused in the surrounding stroma, as in certain acute cases of mammary cancer. I have seen it stated, that uterine cancers of this kind, are commonest in young women, recently pregnant. My experience gives no support to this statement. In not a single one of my acute cases did the disease start prior to the age of 30; 6 were over 40, 2 over 50, and 1 was 68½ years old at its onset. In none of my cases did the début of the disease coincide with, or occur soon after, parturition. These facts indicate, that the abnormally rapid progress of the neoplasm, depends more upon the intrinsic properties of its constituent cells, than upon extraneous influences. The most rapidly progressive case of my list, ran its entire course in 4·7 months. Kiwisch has reported an instance in which the total duration was only 5 weeks; and Martin's acutest case lasted only 9 weeks.

Febrile and pseudo-inflammatory complications may be present; and widespread generalisation of the disease often occurs.

In the following case by Henry Morris, the disease ran its entire course in 4 months. The patient was 34 years old; and after having suffered from vaginal discharge for 2 months, generalisation set in. At the necropsy, it was found that the skin and subcutaneous tissues were studded throughout with cancerous nodules; both breasts and axillæ were infiltrated, as well as the neck, mediastinum, pericardium, pleuræ, liver, omentum, peritoneum, mesentery, pancreas, adrenals, bile-ducts, kidneys, broad ligaments, and Fallopian tubes. The os uteri was converted into a mass of soft cancerous growth; there were two similar nodules in the body of the uterus; and the cervix was greatly hypertrophied.

2. **Chronic** cases—that is to say, cases in which the total duration of the disease exceeds 3 years—are rarer than acute ones. Of my 90 uterine cases, 15, or 16·6 per cent., were of this kind. In 3 the total duration of life exceeded 7 years. My most chronic case lasted over 7½ years; when the patient, aged 52, died suddenly from the bursting of a pyo-nephrosis into the peritoneal cavity. The structural characteristics of these chronic growths, differed in no respect from those of the ordinary cylinder-celled glandular cancer. The average age of these patients was 51 years; that for uterine cancer in general being only 44 years. F. Barker has reported an instance of uterine cancer, in which the disease lasted for 11 years.

Cancer of the corpus, averages a slower rate of progress than cancer of the cervix. Odebrecht has lately described a case, in which he successfully extirpated the uterus by abdominal section, for a large cancerous tumour of the corpus; that was known to have existed for 5 years and 4 months, in a patient over 58 years of age.

Colloid cancer of the uterus is an exceedingly rare affection. I have elsewhere (Chapter IX., p. 113) given an account of the only case of the kind, I have ever met with. In his monograph on neoplasms of the cervical part of the uterus, Amann describes only a single uterine case. Menge has since reported another example. Wagner and Lebert have each met with an instance of it. In my case, it seems probable that the disease arose from 'rests' of the rectal mucosa, embedded in an adjacent myoma of the uterus; other cases probably arise from ovarian 'rests.' I doubt whether colloid cancer of the uterus ever occurs, otherwise than in connection with aberrant elements of this kind.

Myxomatous neoplasms, having a gelatiniform aspect, are often erroneously described as 'colloid.'

A very few instances of **melanotic** malignant neoplasms, arising primarily in the uterus, have been reported; most cases of this kind appear to have sprung from the portio, and nearly all of them are described as 'sarcomata.'

Without prejudice as to their histogenesis, it will be more

convenient to consider these cases in the chapter dealing with sarcoma, rather than here.

Cancerous neoplasms, once formed, live and are nourished like normal parts of the body; yet they—in return for the nutriment thus supplied—contribute nothing serviceable. Functionless and redundant, their relationship to the rest of the organism, differs but little from that of parasitism.

The characteristic feature of these growths, is their tendency to persist indefinitely and to increase continuously; yet, under certain ill-understood conditions, the activity of their constituent cells may be so far checked, as to cause the retardation, arrest, or retrogression of the disease. These are what Virchow has called 'retrograding cancers'; and he ascribes the change to nutritive failure, causing degeneration of the cancer cells. Under these circumstances, ulcerated surfaces may become covered with more or less healthy granulations; which may partially, or even completely, cicatrize. Instances of this kind, in connection with the uterus, have been reported by Senger, Rokitansky and others. Unfortunately, the disease continues to spread beneath the cicatrix; so that I cannot instance a single well-substantiated example of its spontaneous cure.

The nearest approaches to cure, are seen in the penultimate stage of the cancerous cachexia, and in other exhaustive illnesses; when, owing to the great general debility, cancerous growths often become stationary, and even appear to wither and dry up.

Secondary Cancer.

The uterus may be invaded by cancer, through the spreading of the disease from adjacent organs, such as the rectum, sigmoid, bladder, ovary, peritoneum, vagina, etc. This usually happens by direct extension; and in certain cases by lymphatic dissemination.

Organs like the uterus, mammæ and stomach, that frequently originate the disease, are seldom the favourite seats of metastases. This form of secondary affection is certainly rare in the uterus. It is noteworthy that mammary cancers

disseminate in the uterus, far more frequently than the cancers of any other region; thus, my analysis of 167 breast cancer necropsies, shows 3 per cent. of metastases in the uterus. Such lesions almost invariably affect the body of the organ—generally its peritoneal surface—and they are usually multiple. In a case of this kind under my observation, there were several nodules on the peritoneal surface of the uterus, as well as in both pleuræ, the right femur and the right humerus.

In very exceptional cases, nodular metastases may be met with in the cervix; and in my work on 'Diseases of the Breast,' I have instanced several examples of this kind, secondary to mammary cancer.

Winckel, Schatz and Waldeyer have reported instances of malignant disease of the peritoneum (Douglas' pouch, etc.), secondarily invading the uterus.

Cachexia.

No special constitutional symptoms indicate the near approach of uterine cancer; and, even the actual début of the disease, is rarely indicated by any obvious deterioration of the general health. Occasionally, however, slight falling off in this respect is noticeable *ab initio*. In most cases, some months elapse before the general health manifestly deteriorates.

Among the earliest indications are failure of appetite, loss of strength, sense of fatigue, pallor and loss of weight. Various symptoms also arise owing to disturbance of the sympathetic nervous system; among these I have often observed alternate flushing and pallor of the face and hands —sometimes so marked as to suggest Raynaud's disease—cardiac palpitation, shortness of breath, syncope and gastric disturbances. I can also testify as to the correctness of Bogdan's observation, that red taches are often visible on the cheeks, owing to dilatation of the superficial blood-vessels. An undue impressionability to cold is also noticeable in many cases. Areas of brownish discoloration may

appear on the forehead, upper lip or other parts of the face (chloasmata uteri), as in pregnancy and various uterine and ovarian diseases. Neuralgic and quasi-rheumatic pains are experienced, not only in the lumbo-sacral and pelvic regions; but in various parts of the body, remote from the primary seat of disease, as well. Headache is often a prominent symptom. Later on, anæmia, weakness and emaciation become pronounced; together with dyspepsia, constipation, anorexia, nausea and vomiting.

The skin gets harsh and dry; and assumes a pallid yellowish tint. The mouth is apt to be parched, the tongue dry; and thirst is complained of.

The great impoverishment of the blood, explains the proneness of cancer patients to thrombosis, phlebitis, passive serous effusions, and subacute inflammatory affections of the lungs.

Not unfrequently insomnia supervenes, the patient becoming depressed and irritable; but the mind usually remains clear to the last. Sometimes the patient eventually falls into an apathetic state, in which both sensibility and intelligence are blunted. Exceptionally, patients become demented; and glycosuria is occasionally observed. Peripheral neuritis is of common occurrence.

Uterine cancer patients seldom take to bed, until the disease has run about half its course. In certain latent cases, the malady may arrive at an advanced stage, or even end fatally, without the manifestation of marked symptoms of any kind.

There is usually no pyrexia, except in some advanced cases; when inflammatory complications may cause the temperature to be slightly raised. More frequently the temperature is persistently subnormal.

These symptoms, in their ensemble, are generally referred to as the cancerous cachexia; that is to say, they are believed to be due to toxic albuminoids—derived from the disintegrating cancer cells—entering the circulation in quantities too great to be quickly eliminated, and so poisoning the system.

Through such agency, the hæmatopoietic organs—especially the lymphatic apparatus — are injuriously affected. Hence the blood gets profoundly modified, both qualitatively and quantitatively. The red blood corpuscles show signs of progressive deterioration and destruction; while the white ones become much more numerous (leucocytosis); and the total quantity of the blood is much diminished, hence the smallness of the heart and large bloodvessels, which is so noticeable post-mortem. Such conditions enable us to understand how it is, that cancer patients bear great losses of blood so badly, to which Bierfreund has lately called attention; hence also the frequency of fatty degenerations, and brittleness of the bones.

In advanced cases of uterine cancer, there is also nearly always more or less subacute uræmia, owing to deficient excretion of urea, consequent on the presence of extensive renal disease; which usually takes the form of double hydronephrosis with atrophy and subacute nephritis.

Headache, insomnia and hebetude, are among the symptoms mainly ascribable to this cause.

Signs of acute uræmia, such as coma and convulsions, are seldom seen; and general dropsy is almost equally rare, but in a few cases there is œdema of the eyelids, etc., with a certain amount of tumidity of the face.

In spite of the frequency of renal disease, hypertrophy of the heart, etc., is seldom observed.

Considering the putridity that characterises these ulcerating cancers, septic complications are remarkably rare; but no doubt they contribute their quota to the ensemble of symptoms.

The copræmia, consequent on chronic constipation, adds also to the general toxæmia.

Hæmorrhages and suppurations, still further impoverish the blood and weaken the patient.

It would be a thankless task, to attempt the differentiation of the precise rôle played by each of these different factors, in bringing about the general dissolution.

Notwithstanding the frequency of suppuration, amylosis is

rare; only 4 instances of it were met with in my 78 necropsies —the spleen being involved in all, and the liver as well in 2 cases.

In the penultimate stage, marked remission of the symptoms is often noticeable, owing to the great enfeeblement. At length—if not cut off by some intercurrent complication (*e.g.* peritonitis, pleurisy, pneumonia, pulmonary embolism, hæmorrhage, etc.)—the gradually increasing asthenia brings the case to a fatal termination: it was thus that death supervened in 64 out of the 90 fatal cases, that ran their natural course under my observation.

CHAPTER XVI

THE GENERAL PATHOLOGY OF UTERINE CANCER

Sex.

MEN possess a rudimentary organ—the prostatic utricle (uterus masculinus)—which is evolved from the fused posterior extremities of the Müllerian ducts, and is therefore homologous with a portion of the utero-vaginal canal of the female; yet, I am not aware of a single instance, in which cancer is known to have originated from the lining membrane of this structure. Herein we have a good illustration of the law—to which I have elsewhere called attention—that functionless, obsolete organs have but little tendency to take on the neoplastic process.

Age.

Under the age of twenty, uterine cancer is hardly ever met with; and it is unknown prior to puberty.

Of 500 consecutive cases in my list, the earliest age at onset was twenty-two and a quarter years. By massing the statistics of several Continental and English authors, Gusserow obtained a total of 3,385 cases; and of this large number only 2 originated under twenty.

The earliest age at which the outbreak of uterine cancer has been duly substantiated, is seventeen years; Schauta and Glatter have each recorded an instance of this kind—the cervix being the seat of the disease, which was glandular cancer.

Mundé and Spinelli have reported cases at eighteen; Beigel,

Eckhardt and Tschop have each met with the disease at nineteen, and Billroth at twenty.

Several instances of so-called cancer of the uterus, at much earlier periods, have been recorded; but, in none of them has the cancerous nature of the affection, been satisfactorily established.

In Ganghofner's case of so-called cancer of the portio, in a girl only nine years old, the eroded papillary outgrowth was more like a non-malignant 'cauliflower excrescence'—of which several instances have been met with in infancy and childhood—than cancer. The clinical history accords with this; for, although the disease was of over two years' duration, it was localised; and there was complete absence of dissemination.

The instances of so-called cancer of the uterus by Heckford at nine months, by Rosenstein at two years, by Laidley at two and a half years, by Barnes at ten, by Simpson at twelve, and by Zweifel at thirteen years, were evidently sarcomatous.

Of 500 cases of cancer of the cervix tabulated by me, the latest age at the onset of the disease was eighty-three years; but it has been known to arise at the advanced age of ninety, and even at later periods.

The following tabular statement is based on an analysis of these cases; and, for the sake of comparison, I have appended the results of similar analyses for cancer of the breast and tongue (in women):

Age-periods.	Uterus.	Breast.*	Tongue and Mouth.†
20 to 25 years	0·2	0·6	3
25 to 30 ,, ...	7·0	4·0	5
30 to 35 ,, ...	11·0	6·0	7
35 to 40 ,, ...	20·0	14·0	4
40 to 45 ,, ...	17·0	16·0	10
45 to 50 ,, ...	16·0	20·0	17
50 to 55 ,, ...	13·0	15·0	22
55 to 60 ,, ...	9·0	10·0	10
60 to 65 ,, ...	5·0	9·0	9
65 to 70 ,, ...	1·0	3·2	6
Over 70 ,, ...	0·8	2·2	7
	100·0	100·0	100·0

* Calculated on 500 cases. † Calculated on 90 cases.

From this it will be gathered, that the occurrence of the disease before twenty-five is a great rarity. During the quinquennium twenty-five to thirty, a certain number of cases are met with; but their number is still comparatively small. Subsequently they occur with increasing frequency, until the decennium thirty-five to forty-five; when they attain their maximum. From forty-five to fifty many cases still occur; but after this there is marked falling off. Very few cases originate after seventy.

It may be inferred from the foregoing, and from what we know of the influence of age in the evolution of cancer in other parts of the body, that the relative liability to uterine cancer lessens progressively, in a marked degree, at each age-period after fifty. Thus the characteristic feature of the uterine cancer mortality, is not its increase with advancing years; but its disproportionate increase in meridional and post-meridional periods. Evidently uterine cancer is not a senile disease, in any sense of the word; and senility *per se*, plays no essential part in its development.

The mean age at onset, the earliest age and the latest, are shown in the following statement; and, for the sake of comparison, I have appended corresponding details of other local varieties of the disease in women:

	Uterus.	Breast.	Tongue and Mouth.
Mean age	44	48	50
Earliest age	22·25	24	24
Latest age	83	84	77·5

For some of the other chief local forms of cancer in women, I have found the mean age at onset to be as follows: rectum 53·4 years, œsophagus 50·6, skin 45·8, rodent ulcer 42·7, and stomach 40·5.

For men, the average age at onset is: skin 58, œsophagus 56, tongue and mouth 53·8, lower lip 51·6, stomach 51, rectum 50·7, mamma 50, penis 47·5 and rodent ulcer 40·5.

Of cancer in general, it may be said that the period of maximum frequency is much influenced by sex, for in females it supervenes earlier than in males; for the former, the period

of greatest relative frequency, is the decennium forty-five to fifty-five; for the latter, the decennium fifty-five to sixty-five. This difference is evidently due to diversity in localisation, rather than to any general constitutional peculiarity correlated with sex; for, the mean age at onset of uterine and mammary cancers—which together constitute over 70 per cent. of all cancers in women—is much earlier than that for cancer of other localities in women, the age of maximum frequency varying in diverse localities even in the same sex.

Ever since Broussais wrote, 'Les règles douloureux annoncent un foyer d'irritation dans le col utérin, et le cancer de cette partie en est souvent la suite à l'époque qu'on appelle critique, quand on n'a pas calmé l'irritation longtemps avant cette époque,' attempts have been made to ascribe the great frequency of cancer of the female reproductive organs, to catamenial derangements.

In this connection I have ascertained the following facts:—

Of 100 uterine cancer patients under my observation, the disease was first noticed:

Before the menopause	in 50
About the time of the menopause ...	in 21
After the menopause	in 29

In these patients, the mean age at the first appearance of menstruation was 14·5 years, and at its cessation 46 years.

The longest interval between the menopause and the onset of the disease was 27 years.

Thus the flow is established earlier, and ceases later, in these cancer patients, than in the generality of English women, in whom the catamenia usually begin at 15 and cease at 45.

Of 104 uterine cancer patients, menstruation had been normal in 96; and irregular only in 8 (scanty 6, profuse 2).

These facts suffice to show that, even in uterine cancer patients, the normality of the catamenial function is seldom disturbed; that it begins earlier and ceases later in them than in the generality of women, is simply an indication of the more vigorous sexual life of cancer patients, which accords

with other facts, ascertained by me, relative to their life-history, such as high fertility, early marriage, etc.

It is thus evident, that the catamenial function has no causal connection with the development of cancer of the uterus.

Here it must be noted, that cancer of the corpus originates at a considerably later period, than cancer of the cervix. According to Hofmeier, the average age at its onset is 54·5, or ten years later than the age at which cervical cancer supervenes. As the subjoined table which I have compiled shows, most cases arise during the decennium fifty to sixty (51 per cent.); whereas, with cervical cancer, the period of maximum frequency is the decennium thirty-five to forty-five (37 per cent.)—

Age-periods.	Cancer of Corpus Uteri.
20 to 30 years	8·3
30 to 40 ,, ...	3·6
40 to 50 ,, ...	19·0
50 to 60 ,, ...	51·2
60 to 70 ,, ...	16·7
Over 70 ,, ...	1·2
	100·0

To sum up: we learn from the foregoing, that while the forces of growth, development, and reproduction are in greatest activity—during the periods of intra-uterine life, infancy, childhood, adolescence, and adult age—the tendency to uterine cancer is exceedingly small. The disease begins to be frequent, as soon as the period of perfection has been attained, *i.e.*, after the thirty-fifth year; during middle age and the decline of life, the liability to it increases, after which period it becomes markedly less frequent, and increasingly so as age advances. The principles that govern the age distribution of cancer in general, apply also to its various local manifestations in both sexes. That some parts of the body—such as the uterus and mamma—are attacked at an earlier age than others, is due to the fact that the former attain maturity earlier than the latter and *vice versâ*.

The general rule for the uterus, breast and all organs is; that their liability to cancer begins with the decline of their functional activity, and increases while this is progressing.

Thus, the liability to cancer waxes, as the developmental and reproductive activities wane. There is in pathology, as in physiology, antagonism between the forces of genesis, growth, development and expenditure. It is owing to the varied interactions of forces thus called into existence, that the constitution is so different at different periods of life; and that each period has its special morbid proclivities.

In this we have an illustration of the universal biological law; that growth varies according to the surplus of nutrition over expenditure. So long as the surplus exists—that is to say, while nutrition is relatively high—simple **continuous** growth is maintained; but when nutrition becomes relatively low—that is to say, when it is nearly equalled by expenditure—new centres of development are apt to arise, and growth tends to become **discontinuous.** Changes of nutrition determine the transition from the one to the other mode of growth. To the operation of such causes, as I have elsewhere maintained,* the origin of cancers and other neoplasms must ultimately be ascribed.

Complexion, Race, Geographical Distribution, etc.

My researches show that dark-complexioned women are much more prone to uterine cancer, than their fair-complexioned sisters.

Of 107 cases in which I noted this particular, 70 were dark and only 37 fair. When we recollect that among the London lower classes—from whom these cases were taken—the fair type decidedly preponderates, the significance of these figures is enhanced.

Uterine cancer is much commoner in European than in any other countries; and in the tropics it is believed to be rare.

In the United States, it has been observed that negresses

* 'The Principles of Cancer and Tumour Formation,' London, 1888.

are less prone to it than white women; Chisholm reports that, while of 2,423 deaths among white women, 20 were due to uterine cancer; of 7,277 deaths among negresses, only 29 were due to this disease.

Jewesses are neither more nor less liable to it, than the women of other races.

In China, I have ascertained that uterine cancer is fairly common.

There are good reasons for believing that the disease is much more prevalent among civilised nations, than it is in savage and uncivilised communities.

I must refer those desiring further details, to my article on the 'Pathology of Cancer' in vol. xvii. of the 'Twentieth-Century Practice of Medicine.'

Family History.

The problem of heredity in relation to disease, has hitherto seldom been viewed in a right light. The fundamental error has been the tacit assumption, that pathological states, like normal conditions, are almost invariably inherited. It has been overlooked that the predispositions of the organism are to normality; and that diseases—like other recently acquired characters—tend to disappear under suitable environmental conditions. In fact, so great is the preponderating influence of the previous ancestral balance; that diseases are never reproduced in the offspring, with the same constancy and regularity that normal conditions are. Hence, even in families where hereditary morbid tendencies are the strongest, most of the members usually escape; and this is notably the case with cancer.

Nevertheless, it is undoubtedly true, that the descendants of an individual, in whom a new morbid variation has appeared are, other things being equal, more likely to vary again in a similar way, than are persons whose relatives have never manifested such variation. This principle is also applicable to cancer.

To my mind the hereditability of the disease is more conclusively proved, by the occurrence of several instances of the

disease in certain families, in one or in successive generations, than by any other consideration. Although such coincidences may not invariably amount to absolute proof of hereditary transmission; yet, when we see families thus affected, in which neoplasms of the same kind, develop in the same organs, and that during several generations, it seems to me unscientific to deny the hereditability of the disease—especially when, as is so frequently the case, these morbid manifestations are exclusively confined to one side of the family or to one sex.

Such instances of multiple family cancer as the subjoined, prove the hereditability of the disease; for, it is obviously impossible, that those thus affected could have acquired the malady from a common source of infection, and the concurrence cannot be interpreted as a fortuitous occurrence.

1. I have known a woman, aged 53, with uterine cancer, whose maternal grandmother, mother (aged 45), mother's sister; and the patient's two sisters (aged 32 and 36), had all died of cancer of the uterus. She was one of a family of eleven; of her other brothers and sisters, three died in infancy, and five were still alive and well.

2. Atthill mentions the case of a woman, aged 28, with uterine cancer, whose mother and two sisters also died of cancer of the same organ.

3. Guthmann has met with cancer of the corpus uteri in three sisters.

For other conclusive instances of this kind, I must refer the reader to my article in vol. xvii. of the 'Twentieth-Century Practice of Medicine.'

An analysis of the records of 142 consecutive cases of cancer of the uterus, from data collected by myself, gives the following results:

There was a history of cancer in 28 families, or in 19·7 per cent.*

* Of 1,028 cases collected by Gusserow, there was family history of cancer in only 79, or in 7·6 per cent. In all probability this discrepancy in results, is simply due to diversity in the thoroughness of the inquiries made.

The relatives thus affected and the seats of disease were as follows:—

Father's brother (in 1 family) ...	Face.
Father's brother and 3 cousins (in 1 family)	Stomach (brother). Breast (female cousin). Neck (male cousin). Foot (male cousin).
Father's sister (in 3 families) ...	Uterus. Intestine. Arm.
Maternal grandmother (in 1 family)	Uterus.
Mother (in 9 families)	Uterus (2). Breast (2). Stomach (2). Intestine. Abdomen. Face.
Mother's sister (in 6 families) ...	Uterus (2). Breast (2). Locality not stated (2).
Mother's brother, and child of mother's sister (in 4 families) ...	Stomach (brother). Face (brother). Locality not stated (brother). Stomach (sister's child).
Patient's sister (in 8 families) ...	Uterus (6). Breast (2).
Patient's brother (in 1 family) ...	Stomach.
Patient's daughter (in 1 family) ...	Uterus.

These 38 seats of hereditary disease may be grouped thus:—uterus 13, breast 7, stomach 6, face 3, locality not stated 3, intestine 2, abdomen, arm and foot, each 1.

In 2 cases, more than a single relative was affected.

In one of these cases, all the affected relatives were on the mother's side; and in the other, all were on the father's side.

Of the 142 uterine cancer cases investigated by me, in 3 families there was a history of non-malignant growths.

1. A female cousin of the patient's mother had an 'abdominal tumour.'

2. The patient's father had 'a tumour' removed from his thigh, when he was thirty years old, which did not recur.

3. One of the patient's sisters had a lipoma of the shoulder.

Analysis of the family history of 129 patients with uterine cancer shows that—besides their undue liability to cancerous disease—such families also manifest other hereditary proclivities, which may be summarised as follows:

1. They are very much more prone to **pulmonary tubercle** than the rest of the community. Thus one or more members of these 129 families had died of phthisis in 60 instances, or in 46·5 per cent. This is nearly as high a percentage of heredity, as obtains in the family history of the phthisical themselves; which — in females — has been estimated by Reginald Thompson at 55 per cent. The amount of hereditary phthisis among the rest of the community is certainly much less than this; thus of 108 non-tubercular persons, Kuthy obtained a family history of phthisis in 28·5 per cent.; while, from the data of life insurance offices, the percentage has been estimated by Dovey at only 10·8 per cent.

The results deducible from my analysis of the causes of death of the brothers and sisters of patients with uterine cancer, also show that the relatives of these cancer patients are much more prone to phthisis than the rest of the community. Eighty-one families—in which data of this kind were reported—averaged 7 members each, or 567 members in all. One or more deaths from phthisis had taken place in 41 of these families. Supposing only a single death to have taken place in each of them, this would be equivalent to 1 death from phthisis in 13·8 members; whereas the mortality from phthisis, in the general population, for the corresponding year (1886) amounted only to 1 in 570.

Similarly, among 70 fathers of uterine cancer patients, who had died of various causes, the mortality from phthisis was 24, or 1 in 2·9; among 66 mothers it was 14, or 1 in 4·7; or, among these 136 parents, it was 38, the ratio thus being 1 in 3·6; whereas, the ratio of deaths from phthisis, to the total mortality in the general community, for 1884, amounted only to 1 in 11.

Thus, it is evident, that a large proportion of these cancer patients are the *surviving members of tubercular families.*

The greater frequency with which obsolete tubercle is found in association with uterine cancer, than with most other diseases, also favours this view. Of the 79 necropsies for uterine cancer of my list, obsolete tubercle was found in 12, or in 15·2 per cent.; whereas of Heitler's 16,562 necropsies, on persons who had died of various causes other than cancer, obsolete tubercle was met with only in 789 cases, or in 4·7 per cent.

Although cancer and tubercle are thus intimately connected, it is decidedly rare to find both diseases in active progress in the same individual.* Of my 79 uterine cancer necropsies, there was not a single instance of the kind; Lebert, however, reports having met with 8 instances of phthisis in his 45 uterine cancer necropsies.

The combination of both phthisis and cancer in the same family's history was noted by me in 14 out of 129 uterine cancer cases, or in 10·8 per cent.

2. There is probably more **insanity** in these cancer families than in the general community. Thus of 25 uterine cancer patients interrogated by me, there was a history of insanity in 3 families, or in 12 per cent.

3. My analysis shows, that **apoplexy** is unduly prevalent among the relatives of these cancer patients. Of 136 parents, who died of various causes, 13 died of apoplexy, or 1 in 10·5; whereas the ratio of deaths from apoplexy to the total mortality of the general population for 1884, was only 1 in 36.

Similar undue frequency of this disease is noticeable among the brothers and sisters of these cancer patients; for, while 1 in 567 of the latter died of apoplexy, the mortality from it in the general community in 1884, amounted only to 1 in 1,841.

4. There is reason to believe that the members of these cancer families are also unduly prone to **arthritic manifestations.** My analysis shows 13 deaths from heart disease

* Franqué, however, has found cancer of the cervix concomitant with tubercle of the endometrium.

among 136 parents, or 1 in 15; whereas in the general community the corresponding ratio in 1884, was 1 in 79. From rheumatic fever my analysis shows 2 deaths in 136 parents, or 1 in 68; whereas the ratio for the community at large in 1884, was 1 in 195. There is also evidence of a considerable amount of heart disease among the patients' brothers and sisters; and of my 137 uterine cancer patients 13 had previously suffered from rheumatic fever, and 3 from rheumatism. In this connection it is interesting to note, that a tendency to embonpoint and obesity, usually runs in cancer families; and by some pathologists these conditions are regarded as an outcome of arthritism. According to Charcot, 'Heberden's nodes' are often seen, in the subjects of uterine and mammary cancer.

There still remain to be considered two other proclivities, to which the members of uterine cancer families are remarkably prone, viz., longevity and great reproductive fecundity.

5. The evidence furnished by my analysis, as to the **longevity** of the parents of these patients, is of the most striking and conclusive kind. To prove this, it will suffice to mention only a few of the leading facts:

Of 97 dead fathers, 6 attained the age of 80 years, which is equivalent to 618 per 10,000; whereas in the general population only 493 males live to this age out of 10,000.

Of 90 dead mothers, 8 attained the age of 80 years, which is equivalent to 888 per 10,000; whereas in the general population only 682 females live to this age out of 10,000.

Of these 187 parents 2 attained the age of 95, which is equivalent to 107 per 10,000; whereas in the general population only 21 per 10,000 live to this age.

6. Equally conclusive, is the evidence as to the great **fecundity** of these cancer families.

Thus 117 of these families, averaged 7 members each, or 819 members in all; whereas, in the general community, the average number to a family is about 4·6, so that an equal number of families would include only 549 members.

General Health.

Long-continued observation of cancer patients, in the early stage of the disease, has convinced me; that most of those affected are large, robust, well-nourished, florid persons, who appear to be overflowing with health and vitality; and they often present a considerable amount of embonpoint. Mr. and Mrs. John Bull, as so frequently depicted in the pages of *Punch*, are the physical types of the majority of cancer patients. Such types are indicative of general hypernutrition.

At first, there seems to be some difficulty in reconciling this appearance of rude health, with the conclusion previously arrived at, that most cancer patients are the surviving members of tubercular families; but, in reality, there is here no contradiction, for it commonly happens that the surviving members of tubercular families, are remarkable for their robust and vigorous appearance.

Beneke describes cancer patients as having large hearts and wide arteries, with small lungs, large livers, and long, large, capacious intestines. This quite accords with what I have myself observed, that cancer patients usually are of a coarse physical type. Those recently attacked never present a cachectic appearance. The small, pale, ill-nourished, and overworked women, of the type so familiar in Lancashire and other large industrial centres, are seldom the victims of this disease.

The pale, sallow, emaciated and woe-begone aspect of patients with advanced uterine cancer, is a consequence; and not an antecedent condition of, the disease.

I have previously referred to many facts which indicate, that the causation of cancer is intimately associated with the conditions of nutrition; and it is especially such influences as are comprised under the terms 'alimentation' and 'domestication,' that seem to me to be of paramount importance.

In the present imperfect state of our knowledge, it is singularly difficult to determine the precise effects of diet in this direction, in any particular case; because, in all probability, its influence only becomes appreciable very

slowly, or after more than a single generation of individuals has been exposed to it.

It may, however, be mentioned in this connection, that of 194 cancer patients—as to whose habitual diet inquiry was made by the Collective Investigation Committee of the British Medical Association—not one had been a strict vegetarian, and but few of them had cultivated the habit of a vegetarian regimen.

That cancer is less prevalent in vegetarian, than in flesh-eating communities, is generally believed; and the following considerations are favourable to this belief.

In Ireland, where a large proportion of the population live chiefly on vegetable diet, the prevalence of cancer, as I have elsewhere pointed out,* is much less than in either of the sister countries.

I have shown from the English prison reports, that cancer is three times more prevalent in the general population, than among the inmates of convict prisons—where but little animal food is allowed and hard work is exacted.† Beneke's statistics are of similar import. The experience of those engaged in workhouses, lunatic asylums‡ and similar institutions—where but little meat is allowed—points in the same direction. The comparative rarity of cancer among the intemperate, is also noteworthy in this connection; for persons of drunken and dissolute habits are seldom affected.

The greater prevalence of cancer in rural, than in urban districts; and, in the latter, its undue frequency in those localities where the well-to-do and easy-going reside, rather than among the poor and working classes, point to the same conclusion. It is, however, certain that vegetarians are not completely exempt.

The immunity of savages; and the great prevalence of the disease in all civilised communities, is probably largely attributable to the influence of diet. At any rate, it is

* 'Twentieth-Century Practice of Medicine,' vol. xvii.

† *Lancet*, vol. ii., 1899, p. 1124.

‡ The Reports of these institutions show, that uterine cancer is very rare among their inmates. Uterine myomata and ovarian cysts, are also remarkably uncommon, among the insane.

certain that savages are, as a rule, less well fed than are the members of modern communities.

Leblanc and others believe, that carnivorous animals are more prone to develop malignant disease, than herbivora.

Meat-eating communities are, as a rule, also alcohol-consuming. There is, however, no evidence to show that the habitual consumption of alcoholic liquors *per se*, in any way predisposes to cancer. The British Medical Association's inquiry indicates, that the effect of this habit has rather the opposite tendency; and this coincides with the results of my own observations, which show that cancer patients have almost invariably led regular, sober and industrious lives. The victims of chronic alcoholism, are generally dyspeptic and ill nourished; and they often manifest a remarkable aversion to meat.

In the course of my investigation into the life-history of cancer patients, I have been much struck with the extreme rarity of **syphilis** in such persons.

Of 165 female breast cancer patients, specially examined by me, not a single one presented undoubted signs of having had syphilis.

Of 160 uterine cancer patients, similarly examined, only one presented signs of having had syphilis.

From the foregoing and from other indications of like import, it may be inferred that the victims of constitutional syphilis, are much less prone to cancer than the non-syphilitic.

This comparative immunity of the syphilitic, is probably due to the depraved nutrition and lowered vitality, caused by the contamination of the system with the syphilitic virus. Turenne was probably aware of this, when he syphilised his recently operated cancer patients, with the object of preventing recurrence.

Here it may be mentioned, that cancerous diseases are met with in the animal world, where syphilis is unknown; so that syphilis cannot be regarded as the cause of cancer, as some have alleged.

In connection with this subject, reference may be made to

the immunity of these female cancer patients from **chronic ulcer of the leg**, of which there was not a single instance in my patients. Considering the commonness of the latter affection in women over middle age, this immunity of the cancer patients is certainly highly remarkable. In the eighteenth century, it was customary to establish 'issues' on each of the four limbs, after operations for the removal of cancer, with the object of preventing recurrence 'by opening a passage for the cancerous virus'; and, under the influence of similar ideas, the operation wounds were prevented from closing by first intention. It is probable that such methods do exert some deterrent influence on the disease, acting like the syphilitic virus—but less powerfully—by lowering the general vitality.

It has been urged by Lambotte and others, that erysipelatous and suppurative affections are of comparatively rare occurrence in the cancerous; and the inference has been drawn, that these maladies—by vaccinal action—protect from cancer.

In order to test the value of the alleged rarity of erysipelas in the cancerous—which is at variance with the impression I had formed after an extensive experience of cancer—I have examined the statistical data of some of the large London hospitals, with the following results.

Of 395 extirpations of the breast for cancer, 40 were subsequently attacked by erysipelas, or 10 per cent.; whereas, of 173 recent scalp wounds, under treatment at one of these hospitals during the same period, only 8 were attacked by erysipelas, or 4·6 per cent.

It would thus appear—as my own experience suggested—that instead of being immune from erysipelas, the cancerous are more than twice as prone to it as the non-cancerous.

Lambotte also states, that there is seldom any evidence of suppurative affections, in the pathological antecedents of the cancerous.

As I was at some pains, several years ago, to determine the maladies to which the cancerous are prone, I find that I have at hand the requisite data for testing the validity of this statement.

Thus, of 130 uterine cancer patients under my observation, 9 had previously suffered from small-pox, 5 from phthisis, 2 from erysipelas, 2 from abscess, 2 from fistula-in-ano, and 1 each from necrosis, lupus and furunculosis.

Of 130 breast cancer patients, 5 had previously suffered from phthisis, 4 from small-pox, 4 from ulceration of the uterus, 3 from erysipelas, 3 from old abscesses of the neck, and 1 each from fistula-in-ano, suppurative tubercular disease of the knee-joint, otorrhœa and whitlow.

To sum up, of these 260 female cancer patients 46, or 18 per cent., had previously suffered from some form of suppurative disease.

To compare with the foregoing, I have found that of 75 women with non-cancerous tumours, 12 had suffered from previous suppurative diseases, or 16 per cent., as follows:—phthisis 3, abscess 4, erysipelas 2, and 1 each from small-pox, ulceration of uterus and hip-joint disease.

From this it appears, that Lambotte's second proposition is as unreliable as his first; for, as these data show, the cancerous are just as prone to suppurative diseases as the non-cancerous.

I have seen a great many cancer patients attacked by erysipelatous and suppurative affections; but I have never noticed consequent marked amelioration of the disease, much less anything approaching a cure. In many such cases, these superinduced affections lead to a rapidly fatal issue.

I believe that most of the alleged cures of malignant disease by erysipelas inoculations, etc., are attributable to diagnostic errors; at any rate, I am convinced that tubercular, syphilitic and chronic inflammatory affections, are often mistaken for malignant disease by experienced surgeons, especially in the uterus and breast; and, I suspect, that cases of actinomycosis are more frequently mistaken for malignant disease than is generally believed. Consequently, every new specific for cancer, has no difficulty in producing a crop of 'cures' to justify itself; although I am convinced that cancer has never really been cured, by any external application or internal medicament whatever.

As for those exceptional cases of malignant disease, in which—after an attack of erysipelas or after inoculation with its toxins, etc.—arrest or diminution has been observed, evidently such conditions are not due to any specific or vaccinal action of the remedy, for similar effects have been produced by many widely different conditions.

For instance, many examples of the regression of mammary cancer in connection with acute outbreaks of pulmonary tubercle, have been reported. Perrion has seen the same disease subside, after an operation for goitre, followed by much suppuration. Téallier has noticed retardation in the progress of uterine cancer during lactation. An instance of the regression of mammary sarcoma, after artificially induced delivery, has been reported by Jahr. In cases of intra-abdominal malignant disease, Bidwell and others have seen marked amelioration ensue, after simple exploratory laparotomy. Beatson's cases of regression of mammary cancer after oöphorectomy, evidently belong to this category. Similar results have ensued after injections of tuberculin and the toxins of erysipelas. Many other such instances might be cited. In the penultimate stages of the cancerous cachexia and most exhaustive illnesses, malignant growths often become stationary, and even appear to wither and dry up, shortly before death. Blanchard and Fleury have reported instances of this kind in connection with uterine cancer.

The only feature common to all such cases, is the extremely debilitated condition to which the patients are reduced; and I think there can be no doubt, that enfeebled vitality is the cause of such improvement as is noticeable. The condition of the patient is, in fact, similar to that brought about by the starvation treatment of cancer, as formerly practised with some success by Hufeland and others.

The liability of insane persons and idiots to cancer, as I have elsewhere indicated, is also decidedly below the average; and they are generally debilitated and of low vitality.

The alleged immunity of the cancerous from infectious diseases, as signalised by Lubarsch, is not corroborated by such data as I have collected.

Thus, of my 267 female cancer patients, 13 had suffered from small-pox (4·8 per cent.), 16 from typhoid fever (6 per cent.), and 1·1 per cent. from pneumonia; whereas of 83 women with non-cancerous tumours 1·2 per cent. had suffered from small-pox, 6 per cent. from typhoid and 2 per cent. from pneumonia.

Virchow believes that the cancerous are more prone to inflammatory affections than the non-cancerous.

With regard to rheumatic fever, of my 267 female cancer patients 24, or 8·9 per cent., had suffered from it; whereas of 83 women with non-cancerous tumours, 7 had been thus affected, or 8·4 per cent.

I have often noticed on the face, chest, and upper limbs of breast cancer patients minute, pink telangiectases; but these are also commonly seen on the non-cancerous of corresponding age. The small outgrowths of warty or dermoid structures, said by De Morgan to coincide with or follow the development of cancer, I have rarely seen in association with breast and uterine cancer; nor have I noticed that eczema, psoriasis, or other dermatoses often appear in the course of this disease, as Bazin and Hardy allege. Herpetic manifestations I have rather more frequently seen. Charcot mentions having often noticed 'Heberden's nodes,' in the subjects of uterine and mammary cancer.

Some authors attach great importance to grief, anxiety, and mental distress, as causes of cancer; and they have adduced statistics in support of their belief. With regard to this, I can only say, that the majority of cancer patients whose life-history I have investigated, appeared to me to have been less exposed to depressing influences of this kind, than most women of corresponding age in the general population.

In most modern text-books on gynæcology, reference is made to the alleged greater **prevalence of cancer among the poor and ill-nourished,** than among those more fortunately circumstanced.

This doctrine has lately received its apotheosis at the hands of Sinclair of Manchester, who says: 'My experience

is that uterine cancer occurs only among the working classes; the apparent exceptions are so few that they are hardly worth discussing. . . . So marked is the difference of incidence, that it might be reasonably affirmed, that if we could place all the lower orders who suffer from privation and depressing environment, for a generation or two, in the position of the more favoured, we should stamp out cancer.'

In support of such statements, reference is made to Hofmeier's statistics, which show that of 16,800 patients at the Berlin Polyclinic, 3·6 per cent. suffered from cancer; whereas in Schroeder's private clinic of 9,400 patients, only 2·18 per cent. were similarly affected.

Such data cannot fairly be quoted as evidence of the greater prevalence of cancer among the poor than the rich; although they may raise a presumption of this kind.

Against the acceptance of this doctrine, I would urge the following considerations, most of which I have previously had occasion to mention:

1. During the last half-century the wealth of the country has more than doubled; its pauperism has diminished more than one-half; crime has declined; sanitary conditions have greatly improved; the mortality from zymotic, tuberculous, and many other diseases has markedly diminished; wages have gone up, while the prices of most commodities have fallen to an extraordinary extent;* the consumption of meat per head has more than doubled, having now reached the amazing total of 131 pounds per head per year; the bulk of the people are better paid, better housed, and better fed than ever they have been before—in short, just such conditions have prevailed as Dr. Sinclair alleges are necessary to stamp

* The Report of the Royal Commission on Agriculture (1897) shows:

(i.) That during the last quarter of a century there has been a fall of over 40 per cent. in the price of the staple cereals, which in the case of wheat is 50 per cent.

(ii.) That in beef the fall has been from 24 to 40 per cent.; in mutton from 20 to 30 per cent.

(iii.) In dairy produce the price has declined 30 per cent.

(iv.) In potatoes 20 to 30 per cent.

out cancer; but, instead of having decreased during this period, the *cancer mortality has more than quadrupled*, the uterus participating in due proportion. The only part of the United Kingdom, where the cancer mortality has undergone no such marked increase, is Ireland; which is just the one part, where material progress has been deficient.

2. The Registrar-General's reports show, that the cancer mortality is *lowest* where the struggle for existence is hardest, where the conditions of life are most squalid, the density of population greatest, the tubercle mortality highest, the general mortality highest, and where sanitation is least perfect—in short, among the industrial classes in our great towns; whereas, among the wealthy and well-to-do, and among the agricultural community, there the cancer mortality is *highest*. The experience of those engaged in prisons, workhouses, and lunatic asylums points in the same direction; for cancer is comparatively rare among the inmates of such institutions, as it is also among the intemperate. Of like import is the great frequency of the disease in civilized communities, whereas among savages it is almost unknown. Moreover in the animal world, it is only the domesticated that are affected; in a state of nature, these diseases are unknown.

3. The ensemble of facts relative to the life-history of cancer patients shows, that they have almost invariably led regular, sober, and industrious lives. Persons of drunken and dissolute habits are comparatively seldom affected.

Of 325 female cancer patients, under my observation, not a single one had ever been addicted to prostitution—so far as I could ascertain—and what is still more remarkable, only a single one presented undoubted signs of having had syphilis. The marked fecundity of these cancer patients, the rarity of sterility and abortion among them, all point in the same direction; for sterility and abortion are of frequent occurrence in prostitutes and in the syphilitic.

Such considerations as the foregoing, seem to me to negative the doctrine of cancer being *morbus miseriæ*. They point to the greater prevalence of the disease among the well-to-do and easy-going, who habitually eat more than is good for them.

In conclusion, I must here express entire concurrence with Moore's statement: 'That cancer is eminently a disease of persons whose previous life has been healthy; and whose nutritive vigour gives them otherwise a prospect of long life.'

The following analysis of the **occupations** usually followed by these patients affords indirect support to the foregoing views:—

Thus of 156 uterine cancer patients:—

Of 106 married—housewife 68, charwoman 8, laundress 7, tailoress 5, needlework 5, monthly nurse 4, cook 2, servant 2; actress, paper factory, nurse, straw-hat-maker and shop-assistant, of each 1.

Of 40 widowed—independent means 8, housekeeper 5, laundress 4, charwoman 4, needlework 3, nurse 3, cook 2, shop-assistant 2, dressmaker 2, obstetric nurse 2; lady's-maid, bath-attendant, flower-maker, straw-hat-maker, school-mistress, of each 1.

Of 10 single—servant 2; lodging-house-keeper, barmaid, waitress, cook, no occupation, tailoress, needlework, shop-assistant, of each 1.

Some idea of the **non-cancerous morbid conditions** prevalent among uterine cancer patients, may be gathered from the subjoined analytical statements:—

In 144 consecutive patients, the following non-cancerous morbid conditions were noted, when the women first came under observation:—

1. Dementia in 4 cases, bronchitis in 2, arcus senilis in 2, deafness (extreme) in 2, capillaries of cheeks unduly obvious in 2; and each in 1 case—lupus, freckles, prolapsed uterus, xanthelasma palpebrarum, patellar exostosis and small-pox scars.

With regard to the state of their general nutrition, etc.:—91 were pale, 66 sallow, 67 emaciated, and in 13 weakness was extreme: 46 of them were moderately nourished and 20 well nourished (3 being obese).

2. In 137 cases, the **previous health** had been good in 104 (with no serious illness since youth in 70), indifferent in 21, and bad in 12.

The following **previous diseases** were noted as having occurred *since* childhood:

Rheumatic fever in 13 cases, typhoid fever in 9, small-pox in 9, bronchitis in 8, leucorrhœa in 7, dyspepsia in 5, hæmoptysis in 4, pleurisy in 4, migraine in 4, pneumonia in 3, inflammation of uterus in 3, prolapse of uterus in 3, hæmorrhoids in 3, chronic rheumatism in 3, hemiplegia in 2, peritonitis in 2, erysipelas in 2, psoriasis in 2, fistula-in-ano in 2, and each in 1 case—epilepsy, palpitation, abscess of neck, abscess of breast, jaundice, lupus, necrosis, enlarged glands in neck, arthritis of knee, cholera, and boils.

3. **Post-mortem examination** of the bodies of 79 uterine cancer patients, revealed the following non-cancerous lesions, etc.:—

In 68 cases the **general condition of the body** was noted: it was emaciated in 60, moderately nourished in 6, well nourished in 2; sallowness was noted in 5 cases and purpura in 1 case.

Lungs:—Old pleural adhesions in 41 cases (general 22—both lungs in 20, the right alone in 2; in 16 cases adhesions confined to region of apex—both 10, the left 4, right 2); emphysema in 23; obsolete tubercle in 12 (both apices in 9 cases, right alone in 2, left in 1—all these lesions were associated with old pleural adhesions); bronchitis in 7; hypostatic pneumonia in 2; hydrothorax in 2; and each in 1 case—broncho-pneumonia, abscess at apex, acute pleuro-pneumonia, and acute pleurisy. In 15 cases the lungs were normal.

Heart:—Small in 9 cases, old mitral disease in 9, atheroma of aortic arch in 6, old disease of aortic valves in 4, hypertrophy of ventricles (right in 2, left in 1, both in 1), dilatation (right) in 3, old disease of auriculo-ventricular valves in 3, old pericardial adhesions in 2, acute pericarditis in 2, brown atrophy in 2, fatty degeneration in 2, mitral vegetations (recent) 1, milk-white patch anterior surface right ventricle 1. In 44 cases the heart was normal.

Liver:—Fatty in 21 cases, nutmeg in 7, gall-stones in 5, small and brown in 2, amyloid in 2; and each in 1 case—

old syphilitic scarring, congestion, thick opaque capsule, and cirrhosis. In 40 cases the liver was normal.

Spleen:—Small in 8 cases, amyloid in 4, large in 2, pale in 2. In 63 cases the spleen was normal.

Other Lesions:—Uterine fibro-myomata in 5 cases, double pyosalpinx in 4, pyometra in 3, small aneurisms at base of brain in 2, single hydrosalpinx in 2; and each in 1 case—single pyosalpinx, ulcer of rectum, scar of old gastric ulcer, and cerebral hæmorrhage.

Among the rarer causes of death, mention must be made of hæmorrhage, tetanus and diabetes.

Multiparity, Lacerations, Chronic Inflammation and Cancer.

I am persuaded that well-ascertained facts justify the belief, that repeated irritations of long duration and moderate intensity are, in a certain proportion of cases, the precursors of malignant disease. Further, I am convinced that parts thus chronically irritated, may thereby be rendered more apt to take on neoplastic action, than they otherwise would have been. In short, there is such a thing as acquired local predisposition to cancer. Thus may we account for the relative frequency, with which certain cutaneous cancers are met with in chimney-sweeps, and other workers in irritant substances, such as tar, paraffin, etc.; here also belong the various 'eczema cancers,' 'lupus cancers,' 'scar cancers,' etc.

Moreover, I believe that malignant disease is more apt to arise in congenital blemishes, such as 'rests,' moles, nævi, 'fleshy warts,' and other developmental irregularities (*e.g.*, misplaced testes), than in corresponding normal structures. That is to say, there is such a thing as congenital local predisposition. I submit that this is as far as the facts justify us in going. But the Broussaisians—who believe that neoplasms are caused by external irritants—are not contented to stop here; for, from such considerations as the foregoing, they draw the unwarrantable conclusion, that chronic inflammatory lesions are the *necessary* antecedents of cancer. It is

against this doctrine that I protest; and I will now proceed to show its erroneousness, so far as the genesis of uterine cancer is concerned.

It is alleged by Emmet and his followers, that the disease is almost invariably caused by child-bearing, lacerations, endometritis, or some of the other maladies incidental to the married state; while others attach great importance to catamenial derangements, the abuse of venereal pleasures, syphilis and gonorrhœa.

As I have previously mentioned, cancer is a disease of persons whose previous life has been healthy, and whose nutritive vigour seems to promise long life. It accords with this, that the natural functions of cancer patients are almost invariably performed with ease and regularity. Thus, in women with uterine cancer, the normality of the catamenial function is seldom disturbed; and that it is established earlier and ceases later than in the generality of women, is an indication of vigorous sexual health.

Just so is it with regard to marriage, for a much greater proportion of uterine cancer patients have been married, than of the female population of corresponding age.

Of 156 women with uterine cancer, under my observation, 146 (93·2 per cent.) had been married, and only 10 (6·8 per cent.) were single; similarly of 168 cases tabulated by West and Duncan, only 3 were single; thus of these 344 uterine cancer patients 311 had been married, or 96 per cent.; and only 13 were single, or 4 per cent. In the general population only 79 per cent. of women over 24 ever marry.

Of similar import is the great fertility of these cancer patients.

Of 143 uterine cancer patients under my observation, only 6 were barren (4·2 per cent.); of 528 patients under treatment at the Berlin Charité Hospital (1883-93) 28 were barren (5·3 per cent.): thus of these 671 patients 34 were barren, or 5 per cent. Among married women in the general community, the amount of sterility is much more than this; it has been estimated by Simpson at 11·6 per cent.

The 137 fruitful women in my list averaged 5·6 children

and 0·9 miscarriage each—the maximum progeny being 13 children and 4 miscarriages (of which there were 2 instances).

With regard to one-child sterility, there were 10 instances of it, or 1 in 13·7; which is almost identical with the ratio found by Ansell to prevail among fertile married women of the general population.

To sum up, 143 married uterine cancer patients, had between them 767 children and 123 miscarriages, the average being 5·3 children and 0·8 miscarriage each.

This amount of fertility exceeds that prevalent in the general community, which averages about 4·6 children per marriage; when allowance has been made for the fact, that a considerable proportion of uterine cancer patients die before the completion of their reproductive life, it is obvious that their fecundity is even higher than from the foregoing figures it appears to be.

The mean age at first marriage (in 63 cases) was 21·6 years; and the mean age at which child-bearing commenced (in 100 cases) was 21·8 years; both of these averages are considerably earlier than the corresponding figures for married women of the general community; and they furnish another indication of the reproductive energy of these patients.

It will be gathered from what has been stated, that uterine cancer is of more frequent occurrence in the married, and in those who have borne children, than in the single and sterile. Must we infer from this, that frequent parturition favours the development of the disease? Certainly no such inference is warranted; for, as the following data show, female cancer patients in general, manifest a similar high degree of fertility.

Thus 15 women with cancer of the rectum averaged 6·3 children and 0·7 miscarriage each; 98 breast cancer patients averaged 3·4 children and 1·1 miscarriages each; 6 women with ovarian cancer averaged 8·2 children each; 7 rodent ulcer patients averaged 6·8 children and 2 miscarriages each; and 9 women with cancer of the tongue averaged 4 children and 1 miscarriage each.

It is evident, therefore, that the high degree of procreative capacity, manifested by these females, is merely one of the consequences of that exuberant general health and nutritive vigour; which, as I have previously mentioned, is a peculiarity of cancer patients.

It may be inferred from the fact, that 10 of the 156 uterine cancer patients of my list, were unmarried, and all save one childless, that virginity is no safeguard against the disease; and if this evidence as to virginity be deemed insufficient, reference may be made to many published cases in which the presence of uterine cancer has been demonstrated in women, who presented all the anatomical signs of virginity.

I have ascertained that in the great majority of uterine cancer cases, the disease does not begin, until many years after the final cessation of child-bearing. Of 32 prolific women thus affected, interrogated by me, in 28 (87·5 per cent.) the disease did not begin until a year or more after the cessation of child-bearing, the average interval between the cessation of child-bearing and the onset of the disease, in these cases, being no less than 12·3 years.

Only rarely does cancer of the uterus arise during pregnancy (6 in 97 cases or 6·2 per cent.); and within a year after parturition its occurrence is equally rare (6 in 97 cases).

These facts corroborate my contention, as to the independence of the outbreak of the disease, of the incidents of the reproductive life.

Here it must be mentioned, that the subjects of cancer of the corpus uteri are much less prolific, than those with cervical cancer.

Of 31 cases of this kind tabulated by Pichot, Ruge and Veit, 14 (45 per cent.) were absolutely sterile and 3 had only 1 miscarriage each; while the remaining 14 had between them 57 children: thus of these 31 women the average progeny was only 1·8 children each. When we recollect the comparatively late age at which this form of the disease supervenes, the significance of these figures is enhanced.

As I have previously pointed out, the ensemble of facts relating to the life-history of the subjects of uterine cancer

shows, that they have almost invariably led regular, sober, and industrious lives. Persons of drunken and dissolute habits are comparatively seldom affected. Of 160 uterine cancer patients consecutively under my observation, not a single one, so far as I could ascertain, had ever been addicted to prostitution; and, what is still more remarkable, only one presented undoubted signs of having had syphilis.

In this connection, the almost complete immunity of uterine cancer patients from chronic ulcer of the leg, is worth noting; among my cases there was not a single instance of it.

According to Glatter, of 365 Vienna uterine cancer patients 91 (nearly 25 per cent.) had been prostitutes; but it must be remembered, that he arrived at this conclusion in a rather peculiar way—viz., by assuming that all those described in the registers as 'Handarbeiterinnen,' were—as a matter of course—'Lustdirnen,' which seems to be an unwarrantable assumption. At any rate, my experience in this respect is diametrically opposed to Glatter's conclusion; and in this I am in accord with Duchâtelet, Lebert, Walshe, Winckel, Tanner and Schroeder. The high fecundity of uterine cancer patients strongly favours my views; for a large proportion of prostitutes are sterile, or relatively infertile.

Martin, Bruns and others, think that previous attacks of gonorrhœa predispose to cancer of the uterus; but they have adduced no convincing arguments in support of this theory, which is at variance with all the information at my disposal.

With regard to the influence of **lacerations** in the causation of uterine cancer, some gynæcologists have gone so far as to assert, that the disease always or frequently originates in them. In order to show the fallacy of this view, it is necessary to bear in mind the following facts about lacerations. They are usually confined to the inferior segment of the uterus; and at first labours they are of such frequent occurrence, as to be regarded by many gynæcologists as inevitable. Injuries of this kind are almost always

multiple; and in the majority of cases the lesion is bilateral, being most marked on the left side, opposite the situation usually occupied by the fœtal occiput. In extent and depth they are variable, but in most cases the injury is only slight. The worst tears are met with after very rapid, tedious and instrumental labours. The occurrence of congenital cervical fissures, very like the traumatic ones and in precisely similar situations, has been demonstrated by Fischel; and it is probable that the latter are often confused with congenital flaws of this kind.

Emmet and his followers, regard lacerations as a veritable Pandora's box of uterine maladies; in fact, the number of diseases they ascribe to this source, well-nigh exhausts the list. With regard to cancer, they even go so far as to assert, that in all cases the disease originates in lacerations.

The only evidence adducible on behalf of these extreme views is the great frequency of lacerations, which, of itself, is of course quite insufficient, even when the two morbid conditions coexist. In cases of this kind, carefully observed by John Williams, in not a single instance, did the cancerous disease, appear to have started from the laceration.

Against any such theory it may further be objected; that if uterine cancer really originated in lacerations, it would—like the latter—nearly always be multiple, and its precise seats of origin would correspond with the localities in which lacerations usually occur; but, in the initial manifestation of the disease, none of these conditions are fulfilled.

Moreover, against the assumed etiological importance of lacerations, is the fact; that the interval between the laceration and the outbreak of cancer, extends over many years, and during this long period the uterus appears to be free from disease.

Thus, the average age at which child-bearing commenced in my cases was 21·8 years; whereas in the same women the average age at which uterine cancer supervened was 44 years; thus between the outbreak of the disease and its alleged causation, a period of no less than 22·2 years intervened.

Of like significance, as previously mentioned, is the long interval usually found between the cessation of child-bearing and the onset of cancer.

Another indication pointing in the same direction, is furnished by the fact, that rapid, tedious and instrumental labours—after which lacerations are commonest and most severe—are relatively rare in uterine cancer patients.

Of 65 cases in my list, in which the character of the labours was noted; in 59 they were natural (tedious or difficult in 9), and only in 6 were they instrumental.

Thus, notwithstanding many allegations to the contrary, no reliable evidence has hitherto been adduced, of any connection between antecedent morbid affections of the uterus and cancer.

The great majority of the patients under my observation, had been remarkably free from previous uterine disease of any kind. Of 137 cases in which special inquiries were made, only 13 had suffered from previous disease of the uterus: viz., leucorrhœa 7, prolapse 3, and endometritis 3.

This is in entire agreement with the facts previously mentioned, as to the good catamenial health of these patients, their remarkable fertility when married, and the ensemble of their life-history.

The great rarity of cancer of the procident uterus is a fact of like import. Schmidt reports that of 294 cases of cancer of the uterus under treatment at the Halle Clinic, only 2 were associated with prolapse; and of 423 women admitted for prolapse, only 2 were found to have cancer as well. The same conclusion is indicated by the rarity with which cancer originates from polypoid pseudoplasms, to which I have previously called attention (Chapter XIV.).

The outcome of all this is: that intrinsic causes are much more important factors in the origination of cancer than extrinsic ones, which are by no means its necessary antecedents. In the vast majority of cases, the outbreak of this disease appears to be *entirely spontaneous;* that is to say, it cannot be attributed to the immediate action of any appreciable extrinsic cause whatever.

Infection, Contagion, Auto-inoculation, etc.

Many attempts have lately been made, to show that cancer is an infectious malady; and, according to Metschnikoff, it should be classed with the miasmatic diseases, that are propagated by spores formed outside the body.

Nothing in the least degree convincing, has hitherto been adduced in support of these views; which are contra-indicated by the fact, that in the crowded cancer wards of the Middlesex Hospital—during a period of twenty years—not a single instance is known in which a ward sister, probationer, nurse, ward servant, surgeon, student or anyone engaged in attendance on the cancer patients, has ever developed the disease.

Surely, if cancer were really infectious, we should see evidence of it in the overcrowded parts of our great towns, rather than in remote rural districts; whence all the alleged cancer epidemics, hitherto reported, have hailed.

Of the numerous attempts that have been made to transmit cancer experimentally, from human beings to the lower animals, the results have invariably been negative or inconclusive.

With regard to human beings, there is no proof that cancer has ever been communicated from one individual to another. The attempts made by Alibert, Biett and others, to inoculate themselves and their pupils with the disease, were uniformly unsuccessful. There is not a single case on record, of a surgeon having acquired cancer during the performance of an operation for its removal, notwithstanding the frequency of exposure to contagion under such circumstances. Of the thousands of persons habitually engaged in attendance upon the victims of this disease, how few have ever become similarly affected! Notwithstanding that many men have had sexual intercourse with women the subjects of uterine cancer, there is not a single well-authenticated case on record, of cancer of the penis acquired in this way. The number of cases in which cancerous disease of the uterus and penis, have coexisted in husband and wife, is so small as to deprive them of all value as evidence of contagion.

I have been able, after considerable research, to find on record only about a score of such cases; yet the frequency of exposure to the risk of contagion is so great, that Noble had no difficulty in collecting the records of 166 cases of pregnancy complicating uterine cancer, published during the ten years 1886-95. During the early stages of uterine cancer sexual desire is undoubtedly increased. Thus, Cohnstein has collected a series of cases, in which several pregnancies had taken place in the course of the evolution of cancer; and it has often happened that women, in whom a previous pregnancy had been complicated by cancer, have again become pregnant; and I even know of instances of pregnancy, after supravaginal amputation of the cancerous cervix, and after curettage for the same.

Yet of 134 men with cancer of the penis—tabulated by Demarquay—only one had a wife with uterine cancer.

Thus, there is reason to believe, that cancer cannot be transmitted from one human being to another, even by contact.

With regard to the auto-inoculability of the disease, however, the evidence forthcoming is so weighty, as to be practically conclusive.

Hahn—for instance—has succeeded in transplanting small cancerous grafts, from recurrent disease of one mammary region, into the healthy breast of the opposite side. At least two other surgeons are reported to have successfully repeated Hahn's experiment, thus establishing — beyond cavil—the auto-inoculability of the disease.

I have found very few experiments on record, as to the auto-inoculability of cancer in the lower animals; Senn's attempts on a dog failed.

In a considerable number of cases it has been observed, that when cancerous growths have remained for some time, in contact with eroded, epithelial-covered surfaces, the latter have at length become cancerous, as if by direct implantation.

Cripps has related the case of a woman, with extensive cancerous ulceration of the left mammary region; who, being unable to put on any dress, had kept her arm—bent at

a right angle—in constant contact with the disease for several months. In consequence of this, the skin in the vicinity of the elbow, became the seat of a cancerous ulcer several inches in diameter. A somewhat similar instance, had previously been recorded by De Morgan.

Examples of the spread of the disease by 'contact infection,' from the uterus to the vagina, have been reported by Thorn, Czempin, Jacobs, Fischer, Lebensbaum, Russell (Baltimore), and others.

One of Thorn's patients, a multipara aged forty-six—whose uterus had been deflected to the right, where it had become fixed in its faulty position by adhesions—subsequently developed cancerous 'cauliflower excrescence' of the portio. Owing to the faulty position of the uterus, the diseased portio was constantly in contact with the left side of the vagina, at a considerable distance from the fornix. In this position papillary cancer developed, which fitted the similar growth on the portio 'like a saucepan-lid.' Elsewhere the vagina was free from the disease.

Niebergall, Winter, Pfannenstiel and Leopold have described cases, in which the primary outbreak of the disease in the corpus uteri, had been followed by the appearance of similar disease in the cervix; which they ascribe to inoculation, by contact with the primary cancerous polyp, or with débris given off from it.

In like manner, instances have been reported by Hamburger and Walter, of the spread of cancer from one vulva to the other.

Facts of similar import, have been noticed in various other parts of the body. Klebs has seen instances, in which cancer of one part of the alimentary tract, had been followed by the development of cancerous nodules of similar structure, at other parts lower down, as if by the implantation there of detached fragments. Moxon has described the spread of the disease from the trachea to the lungs, in a similar way.

Instances have also been observed of the spread of cancer across large serous cavities, such as the peritoneum; thus, in cancerous affections of the abdominal viscera, the pelvic floor

has often been found studded with similar cancerous nodules, owing to fragments detached from the primary growth having lodged and taken root there. Moreover, cancer of the abdominal viscera, projecting into the peritoneal cavity, often invades the opposite layer of the serosa, where this comes in contact with it.

Courtin, Reinecke and others, have called attention to the frequency with which, after tapping for ascites due to cancerous disease, the resulting sinus itself becomes cancerous; as if through infection of the wound, by cancerous elements contained in the ascitic fluid.

Cases have also been recorded, in which the disease has spread by direct implantation, from one lip to another (Bergmann), from one vocal cord to the other, from the tongue to the buccal mucous membrane (Lücke), from the visceral to the parietal pleura, etc.

I have myself seen several instances of the kind, especially in the mouth and bladder, in which it appeared to me almost certain, that cancerous growths had originated in this way.

There are also reasons for believing, that eroded surfaces may become infected, through constant contact with the discharge from cancerous ulcers; and many surgeons (Hahn, Winter, Donitz, Sabatier, etc.) admit the traumatic dissemination of the disease, through inoculation of wounds by the escape of 'cancer juice' during operations.

Schopf reports, that having had to make lateral incisions into the vagina and vulva, during the course of vaginal hysterectomy for cancer of the uterus, these incisions subsequently become cancerous, as if from contact infection.

Hence, care should be taken to avoid cutting into malignant neoplasms, during their removal; for, such is the great tenacity of life and the wonderful proliferative power, of even the most diminutive fragments of cancer, that when left behind, they only too often constitute fresh centres of disease.

Primary Multiplicity, and the Association of Cancer with other Neoplasms.

It is now generally recognised, that cancer may originate primarily from more than a single focus. Pathologists have been aware of this for some time, although it is only recently that the subject has attracted special attention. Such cases are, however, exceedingly rare.

In the uterus, as in the breast and other parts of the body, the initial manifestation of the disease is almost invariably solitary.

Multiple cancerous foci in the uterus, are generally due either to lymphatic dissemination, or to auto-inoculation—by contact infection, traumatic dissemination, etc.

Very few instances of true primary multiplicity have hitherto been recorded, and some of these are not altogether convincing.

Hofmeier and Winter have collected a few such cases, in which squamous-celled cancer of the portio, was associated with cylinder-celled glandular cancer of the corpus or cervix. Schauta and Binswanger have added to this list; and John Williams has met with an instance, in which two columnar-celled glandular cancers of the canalis cervicalis, were concomitant with squamous-celled cancer of the portio.

It is almost equally rare, for the subjects of uterine cancer to develop independent outbreaks of this disease, in other parts of the body. Of course multiple cancers, situated in different localities, can only be regarded as independent, when each has sprung from the epithelium of its own locality; and consequently, when each has usually different histological structure.

In my work on 'Diseases of the Breast,' I have instanced several cases of the independent outbreak of the disease in the uterus and breast concurrently; and Beadles has since reported a similar instance:—a widow, aged forty-nine, being affected concurrently with squamous epithelioma of the cervix uteri, and glandular cancer of the mamma.

Russell of Baltimore has met with two cases in which—

after vaginal hysterectomy for cancer, without local recurrence —cancer of the breast subsequently developed independently.

Zeiss has reported an example of the independent outbreak of cancer, in the vulva, breast and uterus, concurrently.

In a woman, aged fifty-three, Mercanton has met with independent cancers of the uterus and vagina.

Reichel and others have reported examples of uterine and ovarian cancers, thus arising.

Bard has found squamous-celled cancer of the uterus, associated with cylinder-celled cancer of the pancreas.

Beck met with the same variety of uterine cancer, co-existent with cylinder-celled cancer of the sigmoid flexure of the colon; and Walshe knew of an instance, in which cancer of the uterus co-existed with cancer of the stomach.

Hutchinson mentions the case of an elderly lady—whose eye he had excised for melanotic sarcoma—who died ten years afterwards of cancer of the uterus, without having experienced any return of the original disease.

It occasionally happens, that cancer of the uterus is found associated with other uterine neoplastic manifestations, of which myomata and mucosal polypi are the commonest. Of my 79 uterine cancer necropsies, myomata were present in 5, or in 6·3 per cent. In most of these cases mucosal polypi were also present, and in several other cases as well. Uterine myomata were present in 11·3 per cent. of my breast cancer necropsies.

In a remarkable case lately reported by Niebergall, cancer, sarcoma, myoma and mucosal polypi, were all found co-existing in the same uterus; and Milford had previously described an instance of concomitant myomatous, myxomatous, cystic and melanotic neoplastic uterine manifestations.

Examples of concomitant uterine sarcoma and cancer, have been recorded by Luminezer, Emanuel, Rabl-Rückhardt and Keller.

Several alleged instances of mixed malignant neoplasms—forms in which sarcomatous and carcinomatous processes go on simultaneously—have been reported as arising in the uterus. Maier, Kuhnart and Rosenstein's cases belong to

this category. Most tumours of this kind would now be classed as endotheliomata.

Cancer of the uterus is occasionally complicated by ovarian cystoma; but, of my 79 uterine cancer necropsies, there was not a single instance of it. Lebert, however, reports that of his 45 uterine cancer necropsies, ovarian cystomata were met with in 3 cases; and, of Winckel's numerous cases of ovarian cystomata, 8 per cent. had also uterine cancer.

Asch has published a case of this kind, in which after having extirpated the cancerous uterus *per vaginam*, he removed the ovarian tumour by laparotomy, the patient recovering; Routh has met with cancer of the cervix, concomitant with a parovarian cyst, whose inner surface was studded with papillary excrescences.

Hulke found a large dermoid cyst, filled with hairs—surrounded by several smaller cysts of the same nature—connected with the uterine appendages, in the body of a woman who had died of uterine cancer; and there were several other dermoid cysts, attached to the under surface of the liver.

De Morgan and Murchison have both seen uterine cancer, associated with multiple lipomata of various parts of the body.

Cancer and Developmental Irregularity.

I have elsewhere (Chapter IV.) had occasion to point out, the frequent association of the genesis of uterine cancer, with certain developmental irregularities of the epithelia of the uterine mucosa. These irregularities are, for the most part, only discernible on microscopical examination.

I must now call attention to certain macroscopical anomalies of this kind, with which cancer has been found associated.

Thus, examples of the concurrence of cancer of the cervix with uterus duplex, have been reported by Zweifel, Pollosson, Huber and others; the association of cancer with uterus bicornis, has been noted by Rossa, Hasse and Janvrin; Wertheim has met with cervical cancer in uterus bicornis unicollis, and Orthmann has found the same disease with

uterus septus. Neugebauer has seen uterine cancer in a pseudo-hermaphrodite with hypertrophy of the clitoris. I have previously referred (Chapter V.) to cases by Czerwenka and Jackson, in which both cancer and myomata were associated concurrently with uterine developmental defects.

This subject is at present in its infancy; but it seems to me clear, that developmental irregularity plays an important part in the pathogenesis of cancer and other neoplasms.

CHAPTER XVII

EPIDERMOIDAL AND ENDOTHELIAL CANCER

Epidermoidal Cancer.

THE foregoing seems to be a much better name for this form of cancer, than the term 'squamous epithelioma,' by which it has hitherto generally been known in this country. The disease may arise from any part of the uterus, where epidermoidal cells pre-exist. Most cases start in the vicinity of the os externum, from the epidermoidal cells of the portio, or from their extensions into the adjacent parts of the mucosa of the cervical canal, etc. Quite exceptionally, cancers of this kind spring from the mucosa of the corpus uteri (Gellhorn, Reis, Piering, Gebhard, etc.)—from aberrant epidermoidal cells embedded there, to which reference has previously been made (Chapter IV.).

Epidermoidal cancer of the portio is comparatively rare; in this, as in other respects, it much resembles its vaginal prototype. Since neither hairs, sebaceous glands, nor sweat follicles, exist in the skinlike membrane lining the portio; it is to the interpapillary processes and their aberrant extensions, that we must look for the initiation of the disease. These, ingrowing into the adjacent tissues, form there branching structures; which—as previously mentioned—assume either a lobular or tubular disposition, the former being the commoner.

The first obvious manifestation of the disease, usually presents as a small, hard thickening, lump, nodule or warty

excrescence, involving one or other of the lips of the os externum. Erosion and ulceration soon supervene.

The typical ulcer has a hard, raised, craggy everted edge, with a depressed indurated base, which is firmly adherent to the adjacent tissues. The latter are generally thickened. On section, firm, dry, friable, whitish new growth is revealed.

Histological examination shows numerous large, branching and anastomosing collections of epithelial cells, embedded in fibrillar connective tissue, infiltrated with small round cells. The epithelial columns are irregularly bulged

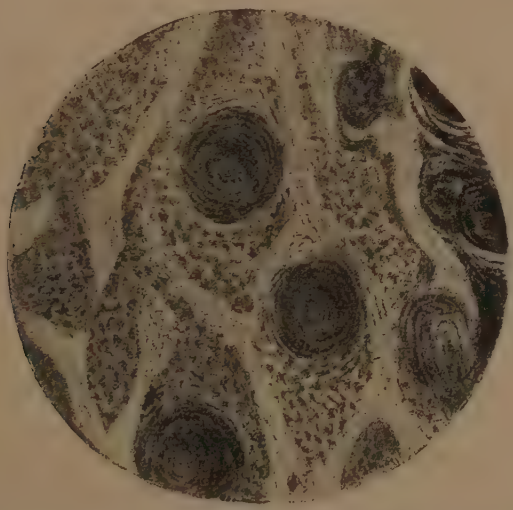

FIG. 54.—EPIDERMOIDAL CANCER OF THE PORTIO, SHOWING INGROWTHS AND 'NESTS.' (GEBHARD.)

and sacculated. They consist of solid aggregations of cells, in various stages of epidermoidal evolution, most of them being of large size, flattened and cornifying. 'Nests' are often met with (Fig. 54). In exceptional instances, processes of vascular connective tissue are found ramifying within the epithelial masses, as in the variety of the disease called **cylindroma.** Bloodvessels and lymphatics abound in the stroma, which may also contain organic muscle cells.

Certain cancers of this kind derive peculiar characters, from the part taken in their formation by the papillæ of the region. These become greatly hypertrophied, branched, infiltrated with small round cells, and even with cancer elements (villous cancer of Rokitansky). The disease begins as a papillary excrescence of the portio. Proliferous arborescent formations thus arise, the precise form of which is determined by the nature of the papillary overgrowth. The commonest form is the 'cauliflower excrescence,' which presents as an irregularly branched, exuberant, fleshy outgrowth, involving one lip or the whole of the portio. In this form, the greatly enlarged papillæ are thickly coated with laminated squamous epithelium; and, in the deeper parts of the growth, epidermoidal ingrowths and 'nests' abound. Bloodvessels of unusually large size are contained within the papillæ; and their surface is often covered with capillaries, so that they are very prone to bleed. Growths of this kind, usually comprise a considerable amount of fibrillar substance. They have been known to fall into a state of slough.

In the much rarer variety of this disease—which is sometimes described as 'true' cauliflower excrescence—the papillary new formation takes the form of soft, dendritic or villous growth, attached by a narrow stalk to the portio, where there is usually cancerous infiltration. In this variety, the papillary new formation contains so little solid substance, that it collapses after removal into a flocculent, quasi-fibrinous mass. Growths of this kind are sometimes multiple.

There is no specific difference between epidermoidal and other forms of cancer of the uterus; but, this form of the disease, runs a more chronic course than is usual with mucosal cancer.

The tendency of these epidermoidal cancers, is to spread superficially rather than deeply; and the disease progresses towards the vagina, rather than towards the uterus. At a later stage, the pelvic connective tissue is invaded, as well as the bladder, rectum, etc. Eventually, dissemination in the

adjacent pelvic lymph glands may occur; but metastases are decidedly rare.

Instances of 'contact infection' have been reported, as mentioned in Chapter XVI.

Certain epidermoidal cancers of the portio, occasionally give rise to a shallow, chronic form of ulceration, of a different type from that above-mentioned (*carcinoma uteri superficiale*). Such ulcers have slightly raised, sharply cut, sinuous edges, with a comparatively smooth base, irregularly studded with small, imperfectly formed granulations; which, in places, have a florid and almost healthy appearance. A thin, parchment-like layer of cancerous growth, generally underlies the affected area. This consists of solid epithelial ingrowths, in which 'nests' are not found. The following example of this condition, which differs in no essential particular from rodent ulcer, has come under my notice:

A single woman, aged sixty-one—who had never been pregnant—having suffered for nearly four years from symptoms of uterine cancer, died of asthenia, no operation having been done. At the necropsy, the body was found to be extremely emaciated. The whole of the uterus had disappeared, with the exception of its thickened peritoneal covering; which circumscribed a pouch, the size of a small orange, into which the vagina led directly. The interior of this cavity and the upper part of the vagina, presented a softish, granular, yellowish-green, smooth discharging surface, in connection with which no induration or infiltration was apparent. The adjacent parts seemed equally free from cancerous disease. Into the front of this cavity the bladder opened, and into its back the rectum, each by a rounded opening the size of a florin. The atrophied ovaries were adherent to the outside of the peritoneal pouch, representing the uterus. This pouch was further strengthened by the matting together of the adjacent pelvic structures, so that no perforation into the peritoneal sac had occurred. There was slight double hydronephrosis. No infiltrated glands could be discovered; nor were there any secondary cancerous deposits elsewhere. The other organs were normal. Microscopical examination of the wall of the eroded cavity, revealed scanty fibrillar tissue, densely infiltrated with small round cells (lymphocytes). Embedded here and there in this

structure, were lobular epithelial masses, consisting of solid aggregations of small irregularly-shaped, epithelial cells, presenting no signs of epidermoidal evolution, and no 'nests.' Many of the cells were in advanced stages of granular degeneration. These structures did not penetrate deeply. Beneath them was a thin layer of the fibromyomatous tissue of the uterine wall, infiltrated with small round cells.

Ever since the recognition of the cancerous nature of rodent ulcer, pathologists have been much exercised, in endeavouring to discover the precise epidermoidal structures in which the disease originates. Thiersch, who first demonstrated the cancerous nature of the disease, thought that it sprang from the sebaceous glands; Fox, Sangster and others, have ascribed its origin to the external root-sheath of the hair follicles; Thin and his followers have traced it to the sweat glands; while other pathologists have maintained its genesis from the interpapillary processes of the epidermis, independently of any appendicular structures. Since neither glands, nor hair follicles, occur in the dermopapillary membrane lining the portio, it follows that in my case, the origin of the disease must be ascribed to the cells of the epidermis. Hence, it may be inferred, that this is the usual seat of origin of the disease.

The term 'corroding ulcer,' was applied to chronic ulcerative disease of the os uteri by the brothers Clarke, who first clearly recognised the condition. They thus designated a slowly-spreading, superficial form of intractable ulceration, which gradually involved the whole portio; and eventually destroyed it. The duration of the disease is often ten years or upwards, and the patients affected are generally over forty; thus, in its clinical aspect, it precisely resembles rodent ulcer; but, no anatomical signs of cancer could be detected in connection with it. Very few specimens of this rare affection, have hitherto been submitted to careful histological examination; in a typical example recorded by J. Williams, no cancer structures were detected. Too much importance need not be attached to a few negative indications of this kind, since the epithelial elements in rodent ulcer are often

scanty, and the small round-celled infiltration very abundant; hence, long after Jacob had differentiated rodent ulcer as a clinical entity, it was nevertheless classed as a non-cancerous disease. Moreover, instances of tubercular ulceration of the uterus, especially those of the lupoid type, have no doubt often been described as 'corroding ulcer.' As to whether any form of ulcerative disease, answering to the description of 'corroding ulcer,' ever occurs in the uterus, as a consequence of local malnutrition dependent upon obliterative arteritis, etc.—as Beuttner, John Williams and others maintain—I am certainly sceptical.

Endothelial Cancer.

Recent researches indicate, that malignant tumours occasionally arise from the endothelial cells of the bloodvessels, lymphatics, etc. These may be described as cancers, since embryologists now admit that the endothelia are archiblastic —rather than parablastic—derivatives. Like other forms of cancer, these tumours disseminate locally, invade the adjacent lymph glands, cause metastases, and recur locally after removal.

Only a few examples of uterine endotheliomata have hitherto been recorded (Braetz, Amann, Orth, Pick, Robb, Hurdon, etc). In nearly all of these cases, the disease sprang from the cervix or portio; but Pick has met with endothelial cancer of the corpus.

In Braetz' case, the patient was a nullipara only eighteen years old. The disease presented as a bleeding, papillated tumour, projecting from the posterior lip of the os. It was extirpated *per vaginam*, together with the whole uterus. All the parts removed appeared to be normal, except the affected cervix. The patient recovered from the operation; but died four weeks afterwards of some unknown cause, and there was no necropsy. Histological examination showed the disease to be endothelioma lymphaticum.

Winckel has described an instance of endothelial cancer of the uterine peritoneum; which is, I believe, unique.

CHAPTER XVIII

THE CLINICAL FEATURES OF UTERINE CANCER

It was lately stated by Halliday Croom, that of 260 uterine cancer patients, applying at the Edinburgh Clinic, all but 15 were too late for radical treatment. Croom is not a keen operator in cancer cases; but, even Winter, finds that two-thirds of those applying, reached his clinic too late for operation.

If only practitioners were more familiar with the signs and symptoms of uterine cancer, the disease would be recognised at an early stage, when many of those affected might be saved by operation.

To this end, such indications as I will now proceed to describe, are of the first importance.

Symptoms.

Cancer of the uterus may be ushered in by certain vague, premonitory indications, such as malaise, lassitude, loss of appetite, leucorrhœa, uneasy sensations in the lumbo-sacral and genital regions, etc.; but these generally pass unnoticed.

Hæmorrhage, discharge and pain, are the symptoms on which most reliance can be placed. Their order of succession, precise mode of association, the relative urgency and duration of each, vary so much in different patients, that no general description will exactly fit every case.

Hæmorrhage is by far the most important revealing symptom of uterine cancer; in at least two-thirds of all

cases, it is the first indication to attract the patient's attention; and, such is its constancy, that it is rarely altogether absent.

In the midst of good or passable health, sudden—often profuse—loss of blood is experienced. This usually appears at some time, other than the catamenial period; and coitus may be its determining cause. If the amount lost be small, even this indication may at first excite no alarm. Usually, however, the initial hæmorrhage is considerable, amounting to a 'flooding'; or, if trivial at first, it soon reappears in exaggerated form. Thus alarm is excited, and the patient is induced to consult a surgeon. It is impossible to insist too strongly on the importance of submitting patients, seeking advice under such circumstances, to a thorough gynæcological examination. Metrorrhagia, occurring for the first time after the complete cessation of the catamenia, is generally due to cancer; but it should be remembered that, for the first few months after the menopause, slight irregular hæmorrhages—of no special significance—are not uncommon.

As previously mentioned (Chapter XVI.), cancer of the corpus generally occurs long after the menopause;* when, therefore, hæmorrhage sets in for the first time after the fiftieth year, and the cervix is found to be healthy, it is generally due to cancer of the corpus.

In those who have ceased to menstruate, the disease may manifest itself by increased profuseness of the catamenial flow, or by its undue prolongation, instead of by metrorrhagia. It is well to bear in mind, that these hæmorrhages occur quite independently of ulceration, which they precede. The blood is furnished by the congested mucosa, which relieves itself by the issue. This accounts for the temporary mitigation of the symptoms, which is so noticeable after 'flooding.' As the malady progresses, hæmorrhages become more frequent; and, in the intervals, the patient is seldom free from leucorrhœal or sanio-serous discharge. In the penultimate stage, however, owing to the great enfeeblement, hæmorrhage

* Eighty per cent. of all cancers of the corpus are of post-climacteric origin.

is much less abundant. Although the total amount of blood thus lost in the course of the disease is very great, yet death from hæmorrhage is decidedly rare; for, of 90 fatal cases under my observation, only 2 succumbed from this cause.

In the initial stage of the disease, a certain amount of leucorrhœal or watery **discharge** is not uncommon; but there is then rarely any fœtor. When irregular hæmorrhages coexist with discharges of this kind, the presence of cancer should be suspected.

With the supervention of ulceration, however, the character of the discharge changes; it acquires a dirty, reddish colour, 'like meat-juice,' as well as great acridity; and a peculiarly fœtid odour. It may be of watery or puriform consistence, and it is generally fairly abundant. Small clots, fibrinous shreds, and débris from the disintegrating neoplasm, are often noticeable in it. The acridity is sometimes so marked, as to cause excoriation of the external genitalia and adjacent parts; and even pseudo-membranous forms of inflammation. In these respects, it differs markedly from the comparatively unirritating glairy discharge of cervical catarrh; and from the muco-purulent exudation of endometritis. Although fœtid discharge is a fairly constant symptom of uterine cancer, yet the mere presence of such a symptom, by no means justifies the diagnosis of that disease. Fœtid discharges are often associated with inflammatory affections of the uterus (*e.g.*, pyometra, senile endometritis, tubercle, etc.); and with other morbid conditions, especially such as involve the presence of any decomposing matter within the organ—*e.g.*, retained blood-clot, placental fragments, sloughing myoma, polypus, etc. On the other hand, the peculiar odour of the cancerous discharge is often not developed, until a late stage of the disease.

Some of those who have written on the symptomatology of uterine cancer, regard **pain** as the most important and constant of the initial symptoms of the disease. My experience lends no support to this view; for, of all the symptoms of uterine cancer, I have found pain to be the most variable and the least reliable. In quite one-seventh

of all cases, no severe pain is complained of, throughout the entire course of the disease. Squire and Thomas have both reported instances of the most destructive forms of advanced uterine cancer, without any pain.

In its normal state, the inferior segment of the uterus is so exceedingly callous to ordinary stimuli; that it would be surprising if much pain were experienced, in the early stages of the disease. Hence, we generally find that the malady has made considerable progress, before the patient's suffering is great; although, in exceptional cases, pain may supervene early.

The pain of uterine cancer, is generally referred to the sacral or hypogastric regions, to the groin, pudenda or thighs.

The earliest painful sensations, are those due to congestion and tumefaction at the seat of the disease; hence, the dull aching and dragging pains in the sacral, iliac, genital and anal regions; and the uneasy sensations associated with micturition, defæcation, etc.

In the later stages suffering is more severe, constant burning, boring and dull aching pains being complained of; together with frequent crises of extreme exacerbation, often of a lancinating neuralgic character.

Paroxysms of colicky pain, recurring in crises, are specially suggestive of cancer of the corpus; and, with this form of the disease, bearing-down pains are often associated.

The worst pains are generally due to invasion of adjacent structures, by the spread of the disease, and to the complications resulting therefrom; and, when the nerves are thus implicated, the pain may be very severe and intractable (*e.g.*, sciatica, etc.).

Inflammatory complications add much to the patient's suffering, especially pelvic peritonitis, salpingitis, etc.

Indications of deterioration of the general health, manifest themselves sooner or later in most cases; and the various disturbances appear, which together constitute the clinical ensemble known as the cancerous cachexia, into the details of which I need not here enter, as they have been set forth in Chapter XV.

It is only during the last six or eight months of their illness, that most patients are bedridden; the total duration of the disease averaging—according to my calculation—about twenty-four months.

Physical Examination.

More reliable information can be gained by digital examination *per vaginam*, and especially by bimanual palpation, than by any other mode of physical examination. In cases of cervical cancer, the speculum need only be resorted to exceptionally, to complete what has been otherwise learnt, as its introduction in such cases is apt to cause pain and hæmorrhage. It is desirable to proceed methodically. Attention should first be directed to the portio vaginalis, especially in the vicinity of the os.

In early stages of the disease, a certain amount of tumefaction or ill-defined hardness, together with tenderness on pressure in some cases, may be the only noticeable abnormalities.

The os sometimes appears semi-dilated—'cancerous ectropion'—and acquires a certain rigidity, owing to the infiltration and congestion of the adjacent parts.

The mucosa overlying the cancerous area may be found adherent or eroded, even very early in the course of the disease.

Most reliance is, however, to be placed on the fact that, owing to the great vascularity and friability of the cancerous new formation, even the gentlest manipulations cause free bleeding; while the finger-nail can readily be buried in the soft tissue of the growth, fragments of which may thus be detached and secured for histological examination.

For the differentiation of chronic inflammatory enlargements of the cervix—with hypertrophy, ectropion, small cysts, etc.—from cancer, Sinclair recommends the following procedure: The portio being exposed with a speculum and the uterus steadied with a volsella, an attempt is made to scoop out some tissue from the suspected area with a sharp

curette. If the disease be malignant, a compact piece of the morbid tissue will easily be detached; whereas, if non-malignant, this result will not be attained.

Heitzmann maintains that cancerous may be distinguished from non-cancerous lesions, by applying to the suspected part a pledget of absorbent cotton-wool, that has been steeped in a 10 per cent. solution of sulphate of copper; under this treatment non-cancerous lesions, such as erosion, ulcer, ectropion, etc., simply blanch, whereas cancers always bleed.

Enlargements of the cervix, due to the presence of small shotty cysts, sometimes simulate cancer; in cases of this kind, the nature of the affection may be recognised, by puncturing the cysts and evacuating their contents.

As the cancerous disease progresses, the uterus becomes more bulky than natural. Bossed excrescences, nodulations, and ulceration appear, together with signs of infiltration. The precise form assumed by the morbid growth, depends upon whether its tendency to burrow, or its tendency to project from the free surface, predominates—the latter being the more usual with growths arising from the portio. These excrescences are generally soft and friable, hence fragments can easily be detached; and they bleed freely when touched. When infiltration predominates, there is tumefaction and ill-defined induration of the part.

Cancerous ulcers usually present as irregular excavations, with raised, bossy edges, in the midst of infiltrated areas.

In the epidermoidal varieties of the disease, the ulcers are generally shallower and flatter—the infiltration being more localised and pronounced—while forms resembling rodent ulcer are occasionally met with. Papillary outgrowths often complicate these ulcerating epidermoidal cancers.

On withdrawal of the examining finger, it will generally be found to be contaminated with blood-stained, fœtid discharge.

The next step is to determine, whether any extension of the disease to surrounding parts has taken place. Normally the uterus is extremely mobile. Infiltration of the parametrium, etc., causes diminution of this mobility, and in advanced

cases the uterus becomes quite fixed; while at the same time it is depressed, so that the vagina appears to be shortened. It is in the vicinity of the vaginal vault—especially in the anterior cul-de-sac—that the earliest evidence of infiltration is likely to be felt, as ill-defined thickness and hardness; later, the disease spreads in the anterior vaginal wall, towards the base of the bladder; and subsequently—in the posterior cul-de-sac—towards the sacro-uterine ligaments and rectum.

By deep palpation directed upwards and outwards, close to the lateral borders of the uterus, the presence of cancerous deposits in the broad ligaments, tubes, the adjacent lymph glands, etc., may be detected. In like manner, by palpating in the direction of the ovaries, their condition may be ascertained. In all such examinations, the bimanual method of examination should be employed.

In cancer cases, the uterine sound is a dangerous and not very serviceable instrument to employ; and I completely reject its use.

Rectal palpation is capable of affording valuable information, especially as to the condition of the corpus, the adjacent parametrium, lymph glands, etc.; so this part of the examination should never be neglected.

Cancer of the body of the uterus, nearly always causes considerable enlargement of the part; although the portio may present hardly any obvious alteration, other than congestion and, perhaps, a certain tumidity. This form of the disease, being commonest in elderly persons, it often happens that the cervix has completely disappeared—the os being flush with the vaginal vault. In all cases of this kind, it is necessary to examine *per speculum*.

If, on examination, discharge be seen escaping from the os—especially if the discharge be sanious, puriform, or offensive—the cervix should be dilated; and the interior of the uterus explored—if possible with the finger—fragments of any suspicious area being removed with the curette, for microscopical examination.

Certain conditions associated with putrid sanious discharge, such as sloughing intra-uterine myoma, sarcoma, pyometra,

tuberculous disease, senile endometritis, etc., sometimes closely simulate cancer of the corpus. Correct appreciation of the ensemble of the case, is of the greatest assistance in discriminating between these conditions; and, in dubious cases, the ultimate decision must rest with the histologist.

When there is a question of an operation being necessary, or when the diagnosis presents any difficulty, examination of the patient should be made under anæsthesia; as the requisite manipulations for forming a correct diagnosis, are thereby greatly facilitated. In dealing with women under fifty, the possibility of pregnancy should always be borne in mind; and I have previously referred to the frequency with which this condition complicates cancer. Retained placental fragments, putrid blood-clots or membranes, impending abortion at an early stage, 'blighted ovum,' etc., are also conditions dependent upon pregnancy, that may simulate or complicate the diagnosis of malignant disease.

As aids to the diagnosis, it is well to bear in mind the following considerations:—

In rather more than one-fourth of all cases, the lymph glands in the groins—of one or both sides—become obviously enlarged in the course of the disease. In cancer of the cervix, this is always a late symptom; but, when the disease starts at or near the fundus, the inguinal glands may become enlarged at a comparatively early date.

The left supraclavicular region should also be examined, as in advanced cases of uterine cancer, the lymph glands in this situation occasionally become enlarged (Troisier's symptom); but it must be borne in mind, that any intra-abdominal cancer may cause this adenopathy.

Œdema of one or both lower limbs—owing to thrombosis, phlebitis or pressure of enlarged glands, etc., on the iliac veins—is met with in about 15 per cent. of all cases.

In about one-sixth of all cases, some tumour can be detected —sooner or later—in the hypogastric region; which implies that the body of the uterus is affected.

Microscopical examination etc., of the blood, sometimes furnishes valuable indications (*q.v.* Chapter XV.).

Differential Diagnosis.

The ancients confounded with cancer many forms of intractable disease, which have since been discriminated as non-cancerous. Unfortunately, this discriminatory process has not made so much progress in uterine pathology, as in some other directions; hence, we still find various non-cancerous uterine diseases, commonly confounded with cancer. In this category tuberculous, syphilitic and various inflammatory affections must be included; and probably also actinomycosis.

We now know that **tuberculous disease** of the uterus, is much less rare than was formerly believed; indeed, according to some observers, it is of commoner occurrence even than cancer. The corpus is the part usually affected; although, in a considerable number of cases, the disease centres in the cervix. Most cases are secondary to tuberculous disease elsewhere; but it is sometimes a primary affection.

The symptoms of uterine tuberculosis may closely resemble those of cancer; but hæmorrhage is nearly always a less marked feature. In tubercle of the corpus, the part is much enlarged, its walls are thickened, and its cavity is distended with yellowish fluid, containing curdy, caseous flakes or thick magma. On removing this, irregular patches of rather deep, sharply punched-out ulceration are seen, each ulcer being covered by a deposit of yellowish, caseous matter. The adjacent parts are thickened by tuberculous infiltration, in which yellowish opaque granules are often noticeable. The cheesy or curdy nature of the discharge, the coexistence of tubercle elsewhere, together with the absence of floodings, may cause the true nature of the disease to be suspected. Even when the disease is tuberculous, however, microscopical examination of the discharge usually fails to reveal the presence of the special bacilli. In order to effect the diagnosis, therefore, fragments of the diseased tissue must be removed by the curette; when, the characteristic giant cells, surrounded by lymphocytes, will be met with; although complete tubercles, as defined by Virchow, are seldom present. Within these giant cells or in their vicinity, tubercle bacilli will generally be found.

Tuberculous ulceration of the portio, presents similar characters to the foregoing, the part being markedly thickened, tumid, and indurated; hence, in most cases, the resemblance to cancer is so great, as to necessitate the aid of the microscope, for making a correct diagnosis.

Under such names as 'lupoid ulceration,' 'corroding ulcer,' 'ulcus rotundum simplex,' 'ulcus serpiginosum,' 'ulcus phagedænicum corrodens,' etc., various ill-defined forms of intractable and exceedingly chronic ulceration have been described.

The process begins in the vicinity of the os, passing thence to the vagina, and exceptionally to the cervix, and even to the corpus uteri. It often lasts for upwards of ten years, the invaded structures being completely destroyed. It seems probable, that under these headings various forms of tuberculous, lupoid and syphilitic disease are included, as well as rodent ulcer. Ulcerations of this kind are rare, since I have met with only three instances, in seventy-nine consecutive necropsies for supposed uterine cancer.

Syphilis may attack the uterus in its primary, secondary or tertiary forms; but, with the exception of the first-named, these manifestations have been very little studied.

Chancres of the portio, like chancres elsewhere, present usually as solitary indurated, painless, shallow ulcers of no great size, emitting but little discharge, and they do not bleed readily; sometimes they are attended by widely-diffused induration and rigidity. Secondary manifestations must be looked for. Soft chancres may be recognised by their multiplicity and other special characters; and, especially by the presence of similar lesions, about the external genital and perianal regions.

Secondary syphilides of the portio take the form of condylomata and erosions. These differ from similar forms of cancerous disease, in that they are usually multiple and non-indurated; moreover, the patient will present syphilitic manifestations elsewhere.

Of tertiary syphilitic affections, the circumscribed gumma and diffuse syphilitic infiltrations leading to fibrosis, have

been recognised—especially as affecting the portio vaginalis; and no doubt such lesions are much commoner than is generally believed. Probably some of the most intractable forms of the so-called 'senile endometritis,' are really due to tertiary syphilis. Ulcerated syphilides of this kind, closely simulate cancer in their clinical features; and often they can only be discriminated by the aid of the microscope.

Referring to lesions of this kind, Winckel says: 'Partially gangrenous syphilitic ulcerations of the vaginal portion, are often very difficult to differentiate from cancer; indeed, so difficult, that specialists in venereal disease have sent their patients to obtain my opinion.'

Many **chronic inflammatory affections** of the uterus—especially such as cause hyperplastic overgrowth, induration and tumidity—often closely simulate cancer. In this category, the so-called 'glandular hypertrophy of the cervix' requires special mention; and, more particularly, that form in which the glandular ectasia, leads to the formation of numerous small, hard, shotty cysts.

In the corpus, 'fungous endometritis' is the lesion that most resembles malignant disease; as it generally causes marked enlargement of the organ and metrorrhagia.

In the portio, inflammatory lesions simulating cancer are produced by papillary outgrowths ('cauliflower excrescences'); as well as by indurated, hypertrophied, and fissured conditions of the cervix, with which ectropion and shotty cysts are so often associated. In differentiating it should be borne in mind, that the course of inflammatory affections is generally very chronic, that pain is well marked, especially in the ovarian regions, and that the discharge is usually not fœtid; whereas in cancer the conditions are just the converse. Moreover, in chronic inflammatory affections, the uterus is generally mobile and tender, the vagina is not implicated, and there is no diffuse induration. In dubious cases, the ultimate decision must rest largely with the histologist; but, even with aids of this kind, the uterus is occasionally extirpated for malignant disease, where none exists.

A small sloughing **myoma,** impacted in the os, may

produce symptoms very like those of cancer; but careful examination will generally reveal the ring of the os, intact.

The hæmorrhages and other conditions associated with impending **abortion**, in the early stages of pregnancy, I have several times seen mistaken for malignant disease. In making the diagnosis therefore, it is necessary to bear in mind the possibility of this contingency.

Sarcoma of the uterus is a rare disease, which may affect the corpus or cervix, giving rise to symptoms so similar to those of cancer; that, in most cases, where the question of differential diagnosis arises, the matter can only be decided, by microscopical examination of fragments of the growth removed with the curette. Sarcomata often arise at much earlier ages than cancers; and some forms (especially the post-partum varieties) progress with great rapidity. The disease may assume the form of a circumscribed tumour, much resembling a myoma; or it may present as a diffuse infiltration of the mucosa, with or without polypoid masses. Certain of these growths (deciduoma malignum) supervene in connection with pregnancy; and they are especially apt to follow abortions due to 'mole' pregnancies. The racemose or grapelike sarcomatous masses, that sometimes grow from the portio, may often be distinguished from cancerous excrescences and papillomatous formations, without the aid of the microscope, by noting the soft, shiny, grapelike nature of detached fragments, which separate with the greatest facility, and are easily ruptured.

Latent Cases.

Here it is desirable to call attention to the fact that cases sometimes occur, in which all the symptoms of cancer are absent; or they are so little marked, as not to attract even the patient's attention, although the disease may have made great progress. In some instances of this kind, women have been known to have continued their usual avocations almost to the end, in blissful ignorance of their condition; and in many cases the true nature of their malady has never been

recognised at all, until revealed by post-mortem examination. The following illustrative cases are highly instructive:

CASE I.—*Cancer of the cervix, with dissemination in the humerus, mistaken for primary sarcoma of that bone; amputation at the shoulder-joint.*

This case presents some remarkable features. The patient, aged fifty-two years, was admitted into University College Hospital, on account of painful swelling at the upper part of her right arm, of two months' duration. She complained also of considerable loss of power in the part, which had been weakening for a year. On examination, there was found great enlargement of the upper end of the humerus, which extended as far down as the insertion of the deltoid. The overlying skin was reddened and the subcutaneous veins were much enlarged. There was great loss of power in the limb, and constant 'gnawing' pain was experienced, which extended down to the elbow. Passive movements at the shoulder-joint could be effected, but they caused much pain. There was family history of phthisis; and a sister had died from internal cancer. Her previous health had never been good. The swelling was aspirated, but only some blood and fatty matter came away. Under these circumstances, it was resolved to amputate at the shoulder-joint. During manipulation, prior to operation, the bone fractured through the surgical neck. The part was removed by cutting the deltoid flap by dissection and the internal flap by transfixion with antiseptic precautions. The upper part of the humerus, as far down as the insertion of the deltoid, was found to be involved by a malignant growth, but the cartilage of the head was intact. The wound healed quickly, but the patient's health, nevertheless, progressively deteriorated; and she died about seven months after the operation. Some time prior to this, it was discovered that she was suffering from ulcerated cancer of the cervix uteri, to which the cancerous tumour of the humerus was evidently secondary. Histologically examined, the latter growth consisted of fibrous stroma containing numerous small spaces, for the most part lined by but a single layer of short columnar cells, but some of the spaces were filled with cells of a more flattened type, the appearances being similar to those often met with in cancer of the cervix uteri.

CASE 2.—*Cancer of the cervix, with infiltration of both ureters and consequent renal atrophy, in which the only symptoms manifested were those of chronic nephritis.*

The patient, aged fifty-six years, came under the care of Péron with symptoms of chronic nephritis of five months' duration. Anasarca had been present for two months; and the face had the characteristic aspect of Bright's disease. There was a typical *bruit de galop*. The urine was clear, excessive in quantity, and it contained a little albumin. She died two months later with symptoms of uræmia, never having presented any symptom suggestive of uterine disease. The necropsy revealed extensive cancer of the cervix uteri; but neither the portio, nor the corpus was obviously affected. The base of the bladder and the adjacent parts of both ureters were infiltrated. There was right hydronephrosis, and left pyonephrosis. The right kidney was reduced to a mere sac; the left kidney was of normal size, but presented signs of chronic interstitial nephritis, on which acute inflammation and miliary abscesses had recently supervened. The other organs were normal, there being no marked hypertrophy of the heart. In the pelvis and in the right iliac region were several cancerous lymph glands.

CASE 3.—*Cancer of the corpus, with dissemination in the peritoneum, that simulated cirrhosis of the liver.*

An exceedingly intemperate woman was under the care of Constantin, with ascites and other symptoms of cirrhosis of the liver. The urine was loaded with urates. No indications of pelvic disease were noticed during life. At the necropsy, the body of the uterus was found to be extensively affected with cancer, the cervix being but slightly diseased. There was extensive cancerous dissemination throughout the pelvic and abdominal peritoneum and in the pelvic and prevertebral lymph glands.

CHAPTER XIX

THE TREATMENT OF UTERINE CANCER

The Radical Operation.

FEW surgical procedures have undergone such remarkable fluctuations, as those which have been devised for the treatment of uterine cancer. The keynote of modern tentatives is the belief that cancer, being at first a local disease, must then be curable by local means, scientifically applied, so as to insure its complete destruction.

Twenty years ago, the only kind of intervention in vogue, was the removal of such of the disease as projected into the vagina. This was effected with the knife, scissors, wire snare, écraseur, curette, actual cautery, or with chemical caustics. Even these limited operations were seldom undertaken. The disease was regarded as hopeless; and *laissez faire* was the order of the day.

The stagnation of this period, was broken by the introduction of Schroeder's method of supravaginal amputation of the cervix in 1878, which was gradually accepted as the standard operation for uterine cancer; and it has probably been done more frequently than any of the more modern methods. This procedure was by no means a novelty, for as early as 1801, Osiander had successfully extirpated the cancerous cervix; and he subsequently did many such operations. Although his example was not followed in Germany, the operation was taken up in France on a large scale, especially by Dupuytren, Lisfranc, Récamier, and Delpech; but, each of these surgeons, having done a series of opera-

tions, abandoned the procedure, so that after a time it fell into oblivion, until, as just mentioned, it was revived by Schroeder.

With regard to these partial operations, we may well ask —with Playfair—'Is there any surgeon in his senses, who would content himself with removing a slice of a cancerous breast, instead of the whole disease?' Why then should we apply a different principle to the uterus? There is really no excuse for such inconsistency. It is the perception of this, that has caused a decline in the popularity of Schroeder's operation. The excellent results lately obtained, by bold attempts at completely eradicating the disease from the breast and other parts of the body, clearly indicate the necessity for more radical methods.

Under these circumstances, vaginal total extirpation came into vogue some fifteen years ago; and it has of late enjoyed a considerable measure of popularity. Modern modes of operating are the outcome of procedures elaborated mainly by Hennig, Czerny, Schroeder, Martin, and Péan. Here again we have to do with the revival of an operation that, after a brief period of popularity, had been abandoned and forgotten for more than half a century. Langenbeck (1813), Sauter (1822), Blundell (1828), and Récamier (1829) are the chief of these early pioneers.

We now come to the present time, when the conviction seems to be gaining ground that, inasmuch as the disease is seldom limited solely to the uterus, it cannot be eradicated *per vaginam;* for the object of modern operations is total extirpation of the disease, rather than of the uterus itself. Hence the revival of abdominal total extirpation—which had been introduced by Freund in 1878—with which the names of Mackenrodt, Rumpf, Clark, Ries, and Werder are more particularly associated.

Recent operative experience has taught us that, but for dissemination, chiefly of the local and latent kind, malignant tumours would be as curable as their non-malignant congeners; hence the after-results of operations for cancer have improved *pari passu* with the thoroughness of operating. In

short, pathological doctrine and surgical experience, point so emphatically to the desirability of extirpating the disease as completely as possible, that modern surgeons have concentrated their attention almost exclusively upon this point; hence, earlier and more thorough operations than have hitherto been customary, are now the order of the day.

In what follows, I propose to discuss the requisites of a satisfactory thorough operation for uterine cancer; and then to refer briefly to the best means for putting these into practice.

1. In the first place, the whole uterus must be removed, whether the primary disease be of the portio, cervix, or corpus. This is necessitated by the freedom with which the bloodvessels and lymphatics—so abundant in this organ—intercommunicate. Moreover, lymph currents are readily set up in directions other than the normal, owing to the inefficiency of the valvular apparatus. Hence, the whole uterine lymph system may be injected, by inserting the syringe into almost any part of the organ. The anastomoses by which the lymphatics of the corpus, cervix, and portio intercommunicate, are especially free within the musculature, and along each lateral border of the organ, while inferiorly they are joined by vaginal offsets. It is generally believed, that cancer of the uterus has special tendency to remain localised; but on this subject there has been much exaggeration. According to my experience, the disease always disseminates sooner or later. In fatal cases, that have run their entire course without interruption, I have almost invariably found more or less local dissemination. Leopold and Mackenrodt have arrived at similar conclusions. Of 127 cancerous uteri removed *per vaginam*, Leopold found local dissemination in 68, or in 54 per cent. Similarly Mackenrodt —on microscopical examination of the apparently healthy tissues divided by the surgeon's knife—found in them numerous cancerous foci, showing that the removal of the disease had been but incompletely effected. Cancer of the inferior uterine segment, tends to spread downwards, forwards, and outwards, towards the anterior vaginal wall and

the base of the bladder, probably because of the greater freedom of the lymphatic channels along these lines; and in the corpus the disease tends to spread towards the peritoneum; but its extension is by no means limited to these particular directions. In many instances primary cancers of the cervix and portio, are associated with cancerous foci in the corpus and elsewhere. Seelig has shown that the communications between the lymphatics of the inferior uterine segment and those of the corpus, are much freer through the numerous large branches within the musculature, than through the much smaller ones uniting the mucosa of the two uterine segments. He believes that most cases of multiple uterine cancer, are due to dissemination of the disease along these lines, rather than to multiple origin. In addition to the foregoing, the mucosa of a cancerous uterus is never in a healthy condition; it is thickened throughout from hyperplasia, which is often a precancerous indication. These various considerations show the necessity for removing the whole organ.

2. The union between the inferior uterine segment and the upper part of the vagina is so intimate, that in operations for the extirpation of cervical cancer, the upper part of the vagina should always be removed as well. In cancer of the inferior uterine segment, the adjacent part of the vagina is nearly always invaded. Thus, of 78 necropsies for this disease, I found extensive infiltration of the vagina in 72; and in the other 6 cases less obvious signs of dissemination were noticeable on careful examination. Moreover, after vaginal hysterectomy, recurrence in the vaginal scar or its immediate vicinity is of common occurrence; hence the necessity for extirpating the upper part of the vagina *en masse* with the uterus, in every case of operable cancer of the inferior uterine segment.

3. The parametric tissues, especially those in the vicinity of the cervix and the upper part of the vagina, should be freely extirpated, as far as possible *en masse* with the ablated utero-vaginal canal; for this is a favourite locality for dissemination and recurrence. Thus, Hofmeier found that of

47 operated cases, in which recurrence took place during the first year after partial vaginal hysterectomy, the initial manifestations were in this vicinity, in no fewer than 45. Winter and others have corroborated these important observations.

4. In operative procedures for uterine cancer, it is important to recollect the frequency with which the disease disseminates in the broad ligaments, tubes, and ovaries. When the neoplasm originates in the fundus or its vicinity, dissemination along this track is of special frequency. Of 78 necropsies for cervical cancer, I found secondary deposits in the broad ligaments in 5 cases. In the same series, the ovaries were invaded in 13 cases—both in 8, left in 3 and the right in 2 cases. Kiwisch found the tubes cancerous in 18 out of 73 necropsies. The observations of others, fully confirm these data. Hence removal of the ovaries, tubes, and broad ligaments, is an essential requisite of every thorough operation for uterine cancer.

5. Although a considerable number of uterine cancers run their entire course, without causing any obvious dissemination in the adjacent lymph glands, yet it would be a mistake to suppose, that lymph-gland dissemination is rare in cancer of the cervix; for, as a matter of fact, the adjacent glands are invaded in the great majority of post-mortem cases. Thus of my 78 necropsies, lesions of this kind were noted in 56, or in nearly 72 per cent. In 28 per cent., however, there was no obvious glandular affection—a much higher percentage of immunity than is met with in cancers of most other localities. Peiser reports having found glandular dissemination in over 50 per cent. of his cases, and Winter in from 20 to 30 per cent.

There are, however, good reasons for believing that lymph-gland dissemination is comparatively rare in the early stages of the disease. Surgeons have not very often met with infiltrated glands in extirpating cancerous uteri; and, after extirpation, glandular recurrence is comparatively rare. Nevertheless, in a certain proportion of cases, cancerous glands exist, even in the early stages of the disease; and, if such are left behind, they will become fresh centres of morbid activity; hence the

necessity of carefully examining those localities, where morbid glands are most likely to be met with, and of effecting their removal when found.

The lymphatics of the inferior uterine segment, emerge at numerous points of its surface; and, after anastomosing in the parametric tissues, they converge to form two, three, or four large trunks, on each side of the cervix. Most of these pass outwards, in or near the base of the broad ligament with the uterine bloodvessels, to a group of glands (ileo-pelvic) situated between the external and internal iliac blood-vessels, which are commonly described as the internal iliac or hypogastric glands. It is the three upper glands of this series that, according to Poirier, receive most of the cervical lymphatics. The next succeeding glands of the series, are situated over the great sacro-sciatic foramen, in close proximity to the great sciatic nerve. Poirier describes these glands, as receiving lymphatics from the upper and middle parts of the vagina; but, according to Cruveilhier, these are the glands usually affected in cancer of the cervix, and they are often the only ones implicated. Some of the cervical lymphatics, pass backwards in the sacro-uterine ligaments to the posterior pelvic wall, there to terminate in the lateral sacral glands, near the bifurcation of the common iliac veins (Peiser).

The efferent branches from the corpus, converge to form two large trunks on each side, which enter the upper part of the broad ligament with the utero-ovarian bloodvessels; whence they pass beneath the ovary, to the upper part of the broad ligament, there to be reinforced by numerous offsets from the ovary and tube, which anastomose with them higher up. Thence they follow the course of the utero-ovarian blood-vessels, to terminate in the lower lumbar glands. Some lymphatics from the corpus go, with the round ligament, directly to the glands in the groin.

6. Lastly, I must mention the great advantage of operating early. Leopold's data serve to illustrate this: after 59 early vaginal operations, there was recurrence only in 14, or in 23·7 per cent.; whereas, after 68 similar operations, in advanced cases, recurrence occurred in 45, or in 66·1 per

cent. Krukenberg's and other statistics are of similar import. Thus, if the best results are to be attained, we must operate early, as well as thoroughly.

It now remains for me to point out: that abdominal section is the only method by which such indications, as those I have mentioned, can be satisfactorily carried out. The original operation of Freund was abandoned, on account of its high mortality. This defect is, however, now remediable. Total extirpation of the uterus—for non-cancerous affections—has lately been effected on a large scale, with a mortality no greater than that of ovariotomy. Hence it may be safely asserted that, with modern experience and technique, abdominal total extirpation of the uterus is not *per se* a particularly dangerous operation. In confirmation of this, I can point to 51 such operations lately done for uterine cancer (Ries, Jacobs, Irish, etc.), with a mortality of only 7, or less than 14 per cent. As this mode of operating, has hitherto met with hardly any recognition in this country, I have availed myself of the present opportunity of calling special attention to it.

Technique.

The problem is to remove the entire uterus, together with the upper part of the vagina, the parametric tissues, the broad ligaments, round ligaments, Fallopian tubes and ovaries, as far as possible *en masse*.

It may be said that all cases are operable, in which—after careful gynæcological examination—it appears probable, that the whole of the macroscopic disease can be removed; provided that there be no serious disease—other than the uterine affection—as a contra-indication.

Thorough disinfection of the vagina—which should then be lightly plugged with iodoform gauze—is a necessary preliminary. It is undesirable to curette or otherwise to interfere with, the integrity of cancerous growths projecting into the vagina, during the course of the operation; for, by so doing, fragments of the disease are likely to be disseminated in the recently-divided tissues, where they may lodge and originate recurrent disease. In the event of cancerous masses

projecting into the vagina, they should be painted with a strong solution of chloride of zinc (20 grains to 1 ounce); and a tampon of iodoform wool, steeped in glycerine iodoform emulsion, should be applied daily for a few days prior to the operation.

The initial steps of the procedure are the same, as for an ordinary hysterectomy.

The patient being in Trendelenburg's position, the abdomen is opened by incision through the middle line, between the umbilicus and pubes. The lower end of this incision should be prolonged as low down as possible, without wounding the bladder; and adhesions are then separated.

The fundus of the uterus is next seized with a volsella, and the organ is raised towards the abdominal wound, being subsequently held in such position as may from time to time be required.

The upper part of each broad ligament is then tied off, at the pelvic margin—external to the ovary—and divided through the infundibulo-pelvic ligament; and, if necessary, this process is repeated again on each side, lower down, so as to include the round ligaments (Fig. 55). These ligatures should be applied as far away from the uterus as possible; and, prior to the division of the parts, the uterine margins of the incision should be secured with pressure forceps.

The precise position of the bladder having been defined with a sound, this viscus is to be separated from the uterus as far as the vaginal vault. To effect this, the peritoneum must first be divided across the front of the uterus, from one round ligament to the other, and detached; the rest of the vesico-uterine separation being effected with the fingers, or with a blunt instrument.

The next step is to dissect out the ureter on each side, from the pelvic brim to the base of the bladder. The ureter crosses the common iliac artery at or near its bifurcation, being there covered only by the peritoneum. This is the rallying-point for finding the ureter (Fig. 53, p. 221).

To expose it, the peritoneum overlying the artery, above its bifurcation, is pinched up and incised; and the artery is followed downwards, until the ureter is found crossing it.

The ureter can then be readily recognised, when taken between the fingers, by its peculiar flat, thick, indiarubber-band-like feel. Any difficulty in the recognition, may be over-

FIG 55.—DIAGRAM SHOWING THE SEATS OF THE CHIEF LIGATURES IN ABDOMINAL HYSTERECTOMY FOR CANCER. (KELLY.)

The arrows indicate the directions of the incisions. The loops show the seats of the three chief ligatures on each side. Va, Vagina; Ur, ureter; Ut. Art, uterine artery; Ov. Art, ovarian artery.

come by ureteral catheterization, after the method perfected by Kelly; but this is seldom necessary.*

* In the event of the ureter being invaded by cancer, the cancerous part must be extirpated; and the distal end of the ureteral stump should be implanted into the bladder, or if this be impossible, into the rectum.

The ureters having been dissected out, are to be held aside, out of the operator's way.

In the course of this dissection the uterine artery can be seen and felt, as it crosses in front of the ureter. It should be followed back to its origin from the anterior division of the internal iliac—by opening up the parts with a blunt instrument—and ligatured as far from the uterus as possible, for in this situation the artery is less closely related to the ureter than elsewhere. It is, however, here surrounded by numerous large veins, which will also require ligatures.

The dissection may now be continued, so as to admit of the free removal, with the uterus, of the parametric tissues; and of any lymph glands that may be in the vicinity.

A similar dissection having been made on the opposite side—and the recto-uterine connections having been severed—the uterus and its adnexa will be found to be attached only by the vagina; which must now be freed as far down as necessary, prior to its amputation.

Some surgeons transfix and ligature the vagina prior to its severance; others effect the division with the thermo-cautery; while, for hæmostasis, others rely on the ordinary methods of clamp and ligature.

In the last case, the vagina is first opened in front—through a small opening into the anterior vaginal cul-de-sac—and this incision is gradually extended all round, bleeding vessels being clamped and ligatured, as they are met with.

In any event, every care should be taken to prevent fouling of the peritoneal cavity, with discharge escaping from the cancerous cervix; and, for this purpose, it is well to apply clamp forceps or ligatures to the vagina, above the contemplated line of severance. This should always be well below the inferior limit of the disease; and, after all oozing has ceased, the vagina should be lightly plugged with iodoform gauze.

Before concluding the operation, careful examination should be made on each side of the pelvis, along the pelvic brim, and along the course of the large bloodvessels, etc., for any enlarged glands; and, in the event of any being found, they should be carefully removed.

If in the course of such proceedings any of the large blood-vessels should be injured, the edges of the wound should be infolded, and stitched together with fine needle and suture, for ligation of these large trunks may be followed by gangrene of the lower limb.

All hæmorrhage having ceased, and the toilet of the peritoneum having been performed, the opposed peritoneal flaps are sutured together, with continuous catgut thread; and the wound is closed, as after ovariotomy.

In the event of the abdominal cavity having been contaminated, by the escape of fœtid discharge, it will be well to irrigate it with warm normal saline solution, before closing the parietal wound.

The after-treatment is similar to that in vogue for ovariotomy; care being taken not to omit precautions against shock, in the shape of warm wraps, warm bottles, warm bed, warm bedroom, horizontal posture, etc.

The chief dangers of the operation are shock, peritonitis, and hæmorrhage.

Recurrent disease should be freely extirpated as a matter of course, as soon as it is recognised, provided that there are no signs of general dissemination.

It is, as yet, too early to refer in detail to the ultimate results attainable by this method, for a sufficiently large number of cases—that have been kept under observation for several years after the operation—have not yet been reported; but, there is every reason to believe, that its advantages over other methods are as great, as in the case of thorough operations for cancer in other parts of the body; that is to say, at least 30 per cent. of those who have recovered from the operation, may be expected to be in good health, and to be free from any return of the disease, five years after the operation.

Cancer and Pregnancy.

'Sadly strange as it may seem'—says Matthews Duncan—'there is scarcely any disease, however formidable or however loathsome, in spite of which sexual intercourse and conception may not take place.'

This is strikingly true of uterine cancer, which is far more frequently complicated with pregnancy than is generally believed; and, in the earlier stages of the disease, no doubt the sexual appetite is increased.

Although the conditions present in uterine cancer seem so unfavourable to fecundation, yet conception frequently occurs; thus, Noble has had no difficulty in collecting records of no less than 166 cases of this kind, reported during the years 1886-95; and, so numerous are these occurrences, that even this large total might easily be added to.

I have seen it stated, that the changes associated with pregnancy, cause the progress of uterine cancer to be greatly accelerated. This is one of those *à priori* statements, that has been handed down from text-book to text-book, without any attempt having been made to verify it. It may be that the course of the disease is occasionally accelerated under such circumstances; but such an event is certainly exceptional. Of twelve cases under my own observation, in which the onset of the disease either coincided with or occurred shortly after pregnancy, not one exhibited any undue acceleration on this account. Moreover, in not a single one of my twenty-four acute cases, did the début of the disease coincide with, or occur soon after, parturition. It is necessary to insist upon this, because surgeons have often been induced to undertake operations for cancer thus complicated prematurely, under the belief that the cancer is certain to progress with exceptional rapidity during pregnancy. Most cases of this kind, referred to by the older authors, were probably examples of deciduoma malignum.

There can be no doubt, that cancer of the uterus greatly increases the danger of parturition, for both mother and child. It strongly predisposes to premature labour; for, of 120 cases tabulated by Lewers, 40 per cent. aborted. According to Hauke, this accident is of most frequent occurrence in the third month; and most of those who pass this period, go to full term. The result, however, is much influenced by the situation of the disease; for, when this is limited to the cervix, gestation relatively often goes to full term.

The dangers to the mother comprise tedious and painful labour, hæmorrhage, rupture of the uterus, failure of the fœtus to be expelled, together with subsequent inflammatory and septic complications.

Of 162 cases tabulated by Theilhaber (1874-93), comprising operated and non-operated, 51 died (31·5 per cent.); the older statistics of Herman, show a higher mortality; for, of his 136 cases, 72 (53 per cent.) ended fatally.

The danger to the children is even greater than to the mothers.

Of 142 cases cited by Theilhaber, the mortality was 53·6 per cent.; and an older analysis of 73 cases, by Mathews Duncan, shows 47 deaths (64·3 per cent.).

When the gestation goes on to full term or thereabouts, the dangers attending parturition are much greater to the mother, than those incidental to premature delivery.

Strange to relate, the newly-born infants of mothers, themselves suffering from uterine cancer, are hardly ever affected with malignant disease; at any rate, I can cite only a single instance of the kind.

The **treatment** of this complication has been keenly debated; and former ideas have of late been considerably modified, owing to the introduction of the abdominal radical operation.

The first matter to be considered is, whether the disease admits of total extirpation; and the second is, the stage of the pregnancy.

A. In the early months of gestation, when the fœtus is non-viable, the mother's condition deserves the first consideration; and, in the event of the disease being operable, the abdominal radical operation should be undertaken at once.

When, however, the disease is too advanced for operation, the pregnancy should on no account be interfered with; for, as previously mentioned, cases that do not abort during the early months of gestation, generally go on without serious trouble until full term or thereabouts. In the event of delivery *per vias naturales* then being impossible, the child should be delivered by Cæsarian section.

B. In the later months of gestation, when the fœtus is viable, the child's condition deserves the first consideration; and the pregnancy should be allowed to proceed to term or thereabouts. When the disease is operable, the child should be delivered by Cæsarian section; and radical extirpation of the cancerous disease should then be effected.

When the disease is inoperable, and delivery cannot be effected *per vias naturales*, Cæsarian section will be called for. Under circumstances of this kind, Theilhaber reports that the mortality of the operation is about 38 per cent.; and nearly all the children are saved.

As the number of patients, treated in accordance with the foregoing indications, is not yet large enough for the purpose of generalisation, I append abstracts of some of the chief cases.

1. Spencer Wells operated in the sixth month of pregnancy, removing the entire uterus by Freund's abdominal method. His patient was a seven-para, thirty-seven years old, with cancer of the cervix; she recovered from the operation, but died with recurrence one year afterwards.

2. Murphy did a similar operation at term, for a four-para, aged thirty-three, who had been in labour for several days, without any progress having been made. The fœtus was dead. She was exhausted from her sufferings and from hæmorrhage. The os would just admit the tip of the finger. The cervix was invaded by a hard cancerous mass, which seemed to encroach on the body of the uterus, while the vagina was free. She died of exhaustion, the day after the operation.

3. Ludwig successfully extirpated the entire uterus by the abdominal method, the patient—forty years old—being in the sixth month of her seventh pregnancy. The cervix was the seat of extensive ulcerated cancer, which had caused much hæmorrhage.

4. For similar disease—in a ten-para, aged forty-two, in the seventh month of pregnancy—Fritsch extirpated the entire uterus by the abdomen. The patient recovered, with a vesico-vaginal fistula; and was free from recurrence,

when last seen, two and a half months after the operation.

5. Mackenrodt has reported three similar operations, undertaken at the fifth and sixth months of gestation—two recovered and one died from the operation: of the two who recovered, one was free from any return of the disease nine months after the operation; and the other died of cancer of the intestine, seven months after the operation.

6. Döderlein, in like manner, successfully removed the uterus in the third month of pregnancy, the patient being a thirteen-para, aged forty-two. A ureteral fistula developed after the operation; but there was no return of the disease, up to eight months after the operation, when she was last heard of.

7. Stocker, in an eight-para, six months pregnant, with cancer of the cervix causing serious hæmorrhage, opened the abdomen; and, finding the fœtus dead, amputated the uterus at the level of the internal os; and then removed the rest of the diseased organ *per vaginam*. She made a good recovery.

8. Zweifel, Fehling and Hernandez have also each done a successful operation of this kind.

It may be confidently anticipated that, with increased experience, the results attained in these initial operations will be greatly improved upon.

Palliative Operations.

The palliative operations for cancer of the uterus that have been lately practised, comprise vaginal hysterectomy, supravaginal amputation, infravaginal amputation, igni-extirpation, curettage, chemical cauterization, ligation of the uterine and ovarian arteries, oöphorectomy, etc.

Vaginal Hysterectomy has hitherto often been the operation of election, for dealing with cancers deemed suitable for total extirpation; that is to say, for cases in which the disease appeared not to have spread beyond the uterus itself. As such cases are now more effectually dealt with by the abdominal operation, the scope of vaginal hysterectomy

in the treatment of uterine cancer, is considerably narrowed. It has, however, been found by Péan, Mackenrodt, Landau and others; that, in certain advanced cases—unsuitable for the radical operation—the progress of the disease may often be checked, and the general condition of the patient benefited, by vaginal hysterectomy.

The subsequent application of the actual cautery to suspicious areas, adds to the efficacy of this method of operating.

The principles and technique of the operation, have been sufficiently described in Chapter XII., to which the reader is referred.

In severe cases, such as are here contemplated, the mortality will be about 15 per cent.

The causes of death, after the operation, are mainly due to septic complications—septic peritonitis, septicæmia, etc. With the object of facilitating extirpation, when the disease has spread beyond the limits of the uterus, and especially when it has invaded the vagina, the latter organ has been split longitudinally; and supplementary incisions have been made into the perinæum, of which Schuchardt's paravaginal and perineovaginal operations are a type. Disease of this kind, has also been removed from behind, by the sacral way—comprising resection of the coccyx and part of the sacrum—as in Herzfeld's operation. All that can be said in favour of these severe procedures is that, in certain exceptional cases, they may occasionally be of some use, although their mortality is considerable.

Supravaginal amputation of the cervix, according to the technique of Schroeder, has been very frequently performed, both as a palliative and radical procedure: in fact, only ten years ago, it was the standard radical operation in this country, although nowadays it is seldom regarded otherwise than as a palliative.

By this method, the whole of the inferior segment of the uterus can be removed; and, with slight modification, a great part of the corpus as well.

The preparation of the patient, and the initial steps of the

operation, are similar to those adopted in vaginal hysterectomy. The portio is seized with a volsella and drawn downwards and backwards, so as to expose the anterior vaginal cul-de-sac. The vaginal wall is then divided transversely, as far as is feasible from the fornix; and, with the finger, the bladder is separated, as far as the vesico-uterine pouch of peritoneum. The portio is then pulled forwards, so as to expose the posterior vaginal cul-de-sac, which is divided in like manner, Douglas' pouch being opened if necessary.

The next step comprises ligation of the uterine bloodvessels, in the lower part of each broad ligament. To effect this, the index-finger is passed rather deeply into one extremity of the transverse incision, and its point is made to project; so as to push forwards the lower part of the broad ligament, which contains the uterine bloodvessels. A blunt-pointed, mounted needle, carrying a stout silk ligature, is passed along the index-finger thus placed, deeply into the wound, emerging through the vaginal wall, at a short distance from its point of entry, so as to embrace the uterine bloodvessels. The ligature is then firmly tied; and the bundle of included tissue is divided on its uterine side. If necessary, one or more additional ligatures of this kind may be applied higher up. A similar procedure is carried out on the opposite side. Some surgeons begin the operation by ligaturing these vessels. The clamp method of hæmostasis, as employed by Landau and others, is described in Chapter XII.

As soon as the cervix is free, it is cut through from before backwards, at the level of the os internum, or higher up. On reaching the cervical canal, a pause in the section is made, while the severed anterior vaginal wall is sutured to the severed uterine wall, the ligature being left long, so as to prevent retraction of the stump. The section is then completed, by cutting through the posterior cervical wall; when the divided posterior vaginal and uterine walls are likewise sutured together. The after-treatment is identical with that for vaginal hysterectomy.

By Baker's modification, of excising a cone-shaped portion

of the uterine body—having the central cavity of the organ for its axis—most of the corpus uteri may also be excised.

The mortality of supravaginal amputation, for advanced cancer, is about 10 per cent.

Infravaginal amputation of as much of the disease as projects into the vagina, is a palliative operation that often gives much relief. The uterine stump may subsequently be scraped with Simon's sharp curette; and, finally, the actual cautery may be applied. This operation is specially suitable for fungating forms of the disease, not amenable to more radical treatment.

Curettage, by itself, is a mode of treatment that gives good temporary results, by effecting the removal of disintegrating tissues, etc.

There can be no doubt that **vaginal igni-extirpation**—as practised by Péan and Mackenrodt—is the best way of dealing with most uterine cancers, not suitable for the radical operation; and with most recurrences. In such operations, cutting instruments and the curette may be used to aid the cautery; or the whole procedure may be done with cauteries.

The patient being anæsthetised, is placed in the lithotomy position, with the surgeon in front and an assistant on each side. Antiseptic solutions, ready for vaginal irrigation, are at hand; and gauze tampons, steeped in carbolised oil, should be ready for application when required.

The largest tubular, boxwood speculum is then introduced, and held in position by an assistant. Another assistant heats several cauteries to white heat; and, as they are cooling, hands them successively to the surgeon, who applies them to the tissues at 'black heat,' irrigating after each cauterisation.

Thus diseased areas are successively cleared away, until all that is accessible has been destroyed. The cauterisation seldom causes much hæmorrhage; but it may be necessary to secure a few bleeding-points with pressure forceps or ligature. Almost the whole uterus may be thus extirpated, with little or no loss of blood.

Péan prefers the actual cautery to Pacquelin's instrument, because the latter is apt to get too hot when in use.

Mackenrodt, who has extensively applied this method to advanced cases, that would have been quite beyond the scope of other operative methods, lost 7 in 39 of his patients; but those who survived experienced relief from hæmorrhage, pain, and discharge, and their life was prolonged.

It is not necessary for everyone to proceed as heroically as Mackenrodt; and, with a little discretion—even in severe cases—the mortality of igni-extirpation need not exceed 10 per cent.

Some surgeons supplement amputation and curettage, with the application of **chemical caustics**. Of such agents, the chloride of zinc paste is the only one that needs special mention in this connection.

Chloride of zinc is a painful application; but, it has the advantage of not being absorbed, and it is easily handled. Its chief disadvantage is, that its action is apt to be much more extensive than was intended. For use it is made into a paste with moist flour—'Fell's paste' is a special preparation of this kind. A small quantity of the paste is spread on one end of a narrow strip of lint; this is then inserted into an incision that has been made in the part to be destroyed, and the dry portion of the strip is packed in behind, so as to absorb any redundancy. A few tampons, that have been moistened with bicarbonate of sodium solution, are afterwards inserted, for the protection of the vagina. These are removed a day or two later. Applications of this kind, may cause nearly the whole uterus to slough away.

The treatment of uterine cancer by **ligation of the afferent bloodvessels**—'atrophying ligatures'—has not been more successful here than in other parts of the body. Beyond checking the hæmorrhage and discharge for a time, it appears that little has been gained by such operations. To thoroughly carry out this method laparotomy must be resorted to.

Jonnesco has thus tied both hypogastrics, the uterine, utero-ovarian and round ligament vessels, with the result that the cancerous cervix sloughed away, while the hæmorrhage and

fœtid discharge ceased for a time. Roux tied both internal iliacs, in several cases, but the consequent improvement in symptoms lasted only for a few weeks. Hartmann and Fredet's results have been equally disappointing. In the light of present experience, it seems undesirable to encourage further tentatives of this kind.

It seems strange that **oöphorectomy** should ever have been practised for the cure of uterine cancer, since—so far as is known—the chief effect of removal of the ovaries on the uterus, is to cause its premature obsolescence; which is just the one condition—above all others—that specially favours the development of cancer. It accords with this *à priori* indication, that not the slightest benefit has ensued from operations of this kind, other than such transient mitigation of symptoms as might naturally be expected to result, from diminution of the local congestion.

The futility of castration as a remedy for cancer, is shown by the numerous cases, that have from time to time been reported, in which—after the removal of both ovaries for various morbid conditions—cancer has nevertheless subsequently developed. For instance, after double oöphorectomy for myomatous disease, many examples of the development of uterine cancer, and of cancer in other parts of the body, have been reported; in like manner, after supravaginal amputation of the uterus by the abdomen for myomatous disease, cancer has often subsequently arisen in the uterine stump, or its vicinity, or in other parts of the body; after the removal of both ovaries and tubes for pysosalpinx, a similar sequence has been observed; and, after laparotomy for ovarian cystic disease—with the removal of both ovaries, as I have elsewhere pointed out*—the development of cancer is of special frequency. Thus I have found, that the cancer mortality of those whose ovaries had been extirpated, was five and a half times greater, than was the cancer mortality of those, who had undergone no such operation.

It seems certain therefore, that the effect of castration is

* 'Oöphorectomy in the Treatment of Cancer': *Medical Times and Hospital Gazette*, March 3, 1900, p. 130.

to favour, rather than to prevent, the development of cancer; consequently, the sooner this mischievous procedure is abandoned, the better.

Thyroid medication lowers the general vitality and diminishes the local congestion, and so sometimes affords considerable relief; but its employment is not devoid of danger.

Even when no operation can be undertaken, the patient's sufferings may be relieved, by careful local and general treatment.

To this end, systematic cleanliness is of the first importance. Vaginal irrigation, with weak antiseptic solutions (permanganate of potash, iodine, boric acid, boroglyceride, sulpho-carbolate of zinc, etc.), should be regularly instituted, a pledget of iodoform gauze being afterwards introduced into the vagina.

Hæmorrhage may be combated by vaginal irrigation with hot water, or with hot normal saline solution.

Erythematous conditions of the external genitalia, etc., are best treated by the application of a dusting-powder of equal parts of calamine and camphorated chalk.

Parenchymatous injections into the tumour substance of absolute alcohol, methylene blue and other substances have been essayed, but without any adequate benefit.

Due regulation of the bowels, is a matter that requires constant attention; for, obstinate constipation—from which I have known death result in several cases—is the rule in uterine cancer. Rectal erosions and ulcers are often thus caused (Fig. 51).

Aperient pills, enemata, and careful dieting (figs, prunes, baked apples, fruit, porridge, etc.), are useful in this respect; as also are Carlsbad salts, etc.

Urinary troubles may be met by the free use of demulcents, Vichy water, and of alkaline mixtures, with hyoscyamus.

Stimulants in moderation, if fancied by the patient, are likely to be beneficial—brandy and potash-water being one of the best.

For the general constitutional condition Fowler's solution,

bromide of potassium, tincture of nux vomica, citrate of iron and quinine, valerianate of quinine, digitalis, effervescing citrates of lithia and potash, are among the most useful.

For allaying pain, reliance must ultimately be placed, chiefly on the various opium and morphia preparations. It is well not to resort to these at first, as they tend to aggravate the constipation and some other symptoms. A good plan is to begin with the smallest dose of laudanum or liquor opii sedativus, that will suffice to procure rest at night; in the later stages, hypodermic injections of morphia are generally required; and, when there is a tendency to vomiting, atropia may be combined with the morphia.

CHAPTER XX

SARCOMA OF THE UTERUS

Our knowledge of this disease is fragmentary and imperfect; hence, in what follows, I shall oftener have to refer to individual cases, than to generalised statements. It may, however, be said, that all forms of sarcoma—met with elsewhere—are also found in the uterus; and it is alleged that this organ is liable to a quite special variety of the disease—deciduoma malignum.

Sarcoma of the uterus is certainly very rare, for my analysis of 2,649 consecutive cases of primary uterine neoplasms comprises only two examples, whereas it includes 1,571 cancers and 883 myomata. Similarly of Gurlt's 4,115 uterine neoplasms, only 8 were sarcomatous. The considerable number of cases of uterine sarcoma lately reported, suggest the probability of the disease being of rather more frequent occurrence, than these figures indicate. Franqué's analysis of 3,366 consecutive uterine tumours (under treatment 1888-98), includes, however, only 16 sarcomata; and of Gessner's 9,133 cases, only 18 were sarcomata. Contrary to the prevailing belief, it appears that the cervix is as often affected as the corpus.

The uterus may be secondarily invaded by sarcoma, although this is rare; and in such cases the primary disease usually originates in the ovaries, great omentum, peritoneum, or other adjacent structure.

For descriptive purposes, it will be convenient to consider uterine sarcomata under the following heads: (1) **Infantile**

forms; (2) the **grape-like** or **botryoidal** form; (3) sarcoma of the **mucosa**; (4) sarcoma of the **parenchyma**; and (5) **deciduo-sarcoma.**

Infantile Forms.

In early life the uterus, like the mamma, is very seldom attacked by any form of malignant disease. This relative immunity, which contrasts so markedly with their subsequent proclivity to diseases of this type, is probably due to the rudimentary condition of these organs in early life; for, the essential features of their anatomy, are almost entirely of post-embryonic origin.

Although no example of congenital malignant disease of the uterus, has hitherto been recorded; it is probable that most infantile sarcomata are of blastogenic origin. Of 73 neoplasms of this kind, tabulated by Gusserow, 4 originated under the age of twenty years. Most infantile sarcomata, present as polypoid tumours springing from the inferior segment of the uterus; they are usually multiple *ab initio;* and they are often accompanied by polypoid excrescences of the adjacent mucosa. Not unfrequently they contain various heterotopic elements, such as striped muscle cells, epithelial islets, etc. In these and in other respects, they much resemble the analogous growths met with in the vagina of children; and, as a matter of fact, both organs are occasionally thus affected, as well as the urethra and bladder. It is probable that these neoplasms arise from aberrant cellular elements, displaced from their normal connections, during the development of the part. They generally appear to be much more innocent than they really are; for, as a rule, they recur rapidly after removal, and are highly malignant.

In a case reported by Holländer, the patient was only seven months old, when the disease was first noticed. It soon recurred after local ablation. On examination two months afterwards, a mass of sarcomatous growth was found projecting from the portio and the adjacent part of the vagina. In its vicinity were numerous polypoid excrescences.

In order to remove the entire disease, the uterus and vagina were extirpated by the sacral way. The child made a good recovery. The neoplasm was a round, and spindle-celled fibro-sarcoma, identical in structure with the primary sarcomatous polyp.

In an infant 1½ years old, Henry Smith found a tumour—the size of a walnut—presenting at the vulva, which was connected by a pedicle with the cervix. The whole uterus was enlarged, its interior being thickly studded with polypoid excrescences, each about the size of a pea, which looked just like ordinary mucous polypi. The tumour was cut away, and the polypi were extirpated with the curette. When last heard of, one year after the operation, the patient was free from any return of the disease.

In C. T. Smith's case, a child, three and three-quarter years old, had a tumour of this kind—of eight months' duration—which projected into the vagina. It recurred rapidly after excision; and, two months later, it was removed again. Recurrence soon followed, and an abdominal tumour then appeared, which rapidly increased. She died thirty-three days after the last operation. At the necropsy, the abdomen was distended by a large purplish tumour, connected with the uterus. The peritoneum contained ascitic fluid. There was double pyonephrosis, with acute nephritis and miliary abscesses of the right kidney. The tumour, which weighed 31 ounces, was a round-celled sarcoma of liver-like aspect. The utero-vaginal mucosa was thickly studded with small mucous polypi.

Similar cases have been reported by Farnsworth at thirteen months; and by Ahlfeld and Pick at various ages.

These neoplasms, are evidently nearly allied to the racemose or botryoidal sarcomata, to be presently described.

As connecting links, the following cases at rather more advanced ages, by Ahlfeld and Kaschewarowa at fifteen years, and by Wirtz at seventeen years, may be cited.

In Kaschewarowa's case, the patient was a maid of fifteen, who had never menstruated. The disease, when first noticed, presented as a polypoid outgrowth from the anterior

lip of the portio. Six weeks after its excision, a recurrent growth—the size of a hen's egg—had formed, which increased rapidly to the size of the fœtal head. Death ensued, five months after the tumour had first been noticed, of tubercle of the lungs. Histologically the neoplasm was a spindle-celled myxo-sarcoma, with areas of striped muscle cells scattered through it.

Similar rhabdo-myomatous elements were found in Wirtz' case.

Many of the malignant tumours of infancy and early life, contain epithelial or quasi-epithelial elements, and this has often led to their being christened 'cancer'; but, it is now generally recognised, that all such neoplasms really are sarcomatous. Several instances of this kind have been reported as occurring in the uterus.

Rosensteins' patient, only two years old, came under treatment for dysuria, caused by an intra-abdominal tumour, which reached far above the pubes. The inguinal glands were enlarged. She died shortly afterwards. At the necropsy, a large mass of new growth was found in connection with the fundus uteri. There were several nodules of similar growth on the peritoneal surface of the bladder. The uterine mucosa was unaffected, as well as that of the tubes and vagina. Both ovaries were normal. Histologically, the tumour consisted of a spindle-celled stroma, the meshes of which contained large, polymorphic epithelioid cells. It is described by the author as 'carcino-sarcoma.'

Other instances of uterine sarcoma in early life have been reported, by Laidley at two and a half years, by Barnes at ten years, by Simpson at eleven years, by *Z*weifel at thirteen years.

In Barnes' case, 'The walls of the uterus were greatly distended, and its cavity filled by a large encephaloid growth, which having originated in the musculature on the left side, had made its way into the cavity as well as outwards. The mesentery, liver and pancreas were affected with similar disease. There had been sanious vaginal discharge, which had been mistaken for precocious menstruation.'

Péan has met with an instance of uterine sarcoma in a child two years old, whose mother died—aged thirty-eight—of malignant disease of the uterus, her mother having also died of the same affection—aged eighty-two.

The Grape-like or Botryoidal Form.

Under this heading, certain peculiar forms of sarcoma are included, that grow from the inferior part of the uterus into the vagina; where they present as pedunculated, grape-like masses—soft, easily detachable, gelatiniform in aspect—resembling hydatid moles. With their structure, various heterotopic tissues—such as striped muscle (rhabdo-myo-sarcoma), cartilage, bone, epithelial elements, mucous tissue, etc.—are frequently intermixed; hence, it may be inferred, that they arise in connection with aberrant elements, sequestrated from the matrix of adjacent tissues during early embryonic life. Growths of this kind are highly malignant; they progress rapidly, recur quickly after removal, and they are very apt to disseminate. The only treatment of any avail, is total extirpation by abdominal hysterectomy; and this should be undertaken as early as possible.

The soft, grape-like masses, that constitute the characteristic feature of the disease, have often been described as myxomatous; but, according to Pfannenstiel, these structures are really due to a kind of lymphœdema of the sarcomatous tissue. Their presence, enables the disease to be readily distinguished from 'cauliflower excrescence.' The average duration of life, in cases of this kind, seldom exceeds two years.

In further illustration of the subject, I append abstracts of some of the chief examples hitherto recorded.

1. One of the earliest cases, is Spiegelberg's. In a maid, aged seventeen, he found a quasi-papillated growth—projecting from the anterior lip of the os—whose surface was studded with transparent-looking cysts, which easily ruptured when handled, exuding a sticky fluid. Recurrence ensued six months after its ablation, and the vagina became filled with a large racemose mass. For

this, total extirpation of the diseased uterus by Freund's method was done; but the patient died soon afterwards, with intra-abdominal recurrence. Histological examination, revealed an œdematous sarcomatous structure, composed of large round and spindle cells. The disease is designated by its author 'sarcoma colli uteri hydropicum papillare.'

2. Winckel has reported another example of a somewhat similar disease ('adeno-myxo-sarcoma cervicis'), in a patient, aged forty. A pear-like, stalked tumour, grew from the anterior lip of the os. Its removal was followed by rapid recurrence, of which the patient soon died. The surface of the tumour was thickly studded with small vesicular projections; so that it looked just like a specimen of myxomatous disease of the chorion. Microscopical examination showed glandular structures—many of which had undergone cystic distension—embedded in a sarcomatous matrix; the cysts and glandular structures were lined with cylindrical epithelium—which was often ciliated—and the stroma consisted of small rounded and fusiform cells, anastomosing in a gelatiniform intercellular substance.

3. Mundé's patient, was a weak, anæmic, unmarried woman, aged nineteen, who had suffered from leucorrhœa and amenorrhœa for two years. On examination, the vulvar orifice was found to be filled by a slimy racemose tumour, which was connected with the roof of the vagina. During the requisite manipulation, handfuls of slimy grape-like structures came away. The tumour was finally removed *per vaginam* with a wire écraseur. Its central part consisted of a firm, fibrous structure. It grew from the portio, and the cervical canal passed through its centre. The uterus was small and mobile. The whole tumour was about 5 inches long by 3 broad. Recurrence soon set in; and, six weeks after this operation, the disease had again attained half its former size. Further operation was declined. Microscopically examined, the tumour consisted of a number of cysts embedded in a sarcomatous matrix, with here and there glandular structures lined by columnar epithelium. It is described by the author as 'a rare case of adeno-myxo-sarcoma of the cervix uteri.'

4. In Pernice's case, the tumour—which grew from the portio vaginalis—contained a large number of elongated, transversely striated, nucleated cells, resembling embryonic muscle cells. In its base were some gland-like structures, lined by columnar

epithelium. Small nodules of hyaline cartilage were also found here and there. The firmer parts of the neoplasm consisted of fibro-spindle-celled tissue; while, in its softer parts, round and stellate celled elements were met with. The tumour presented as a purplish, grape-like mass, bigger than a man's fist (10 centimetres in diameter), which completely filled the vagina and projected from the vulva. The constituent berries, contained a viscid, jelly-like fluid. The canalis cervicalis could be traced through the entire length of the tumour. The patient, whose age is not stated, had been subject to a hæmorrhagic vaginal discharge for six months. The disease was removed by amputating the cervix with a bistoury, well above the tumour. Two months later, the patient was seen again with a recurrent growth, the size of a goose's egg. This was removed with the galvanic écraseur. Nine months later, when she again came under observation, there was further recurrence *in situ;* and a large intra-abdominal tumour, connected with the uterus, reached to the umbilicus. Laparotomy was performed; but the tumour, which was evidently malignant, could not be removed. A month later, the patient died of pneumonia. The recurrent growths consisted of spindle-celled tissue, in which none of the heterotopic elements found in the primary neoplasm were present. By the author the disease is designated 'myosarcoma strio-cellulaire.' Colomiatti, Wirtz, Weber, Kunert and Kaschewarowa have met with similar tumours.

5. In a single woman of twenty-one, Rein found a soft, lobulated tumour—like a 'hydatid mole'—projecting from the portio. It was removed entire; but soon afterwards it recurred, disseminated, and caused death. On section, after removal, areas of soft substance, like Wharton's jelly, were seen embedded in fibroid stroma. In these myxomatous areas, nodules of hyaline cartilage, were found, and here and there small cysts lined with cylindrical epithelium. The disease is named by the author 'myxoma enchondromatodes arborescens.'

6. A somewhat similar case has been reported by Thiede, in which islets of hyaline cartilage and small cysts were found, in a fibro-cellular stroma, rich in dilated bloodvessels. The disease recurred rapidly after ablation, and caused death. The patient was about forty-five years old; and the tumour was pedunculated, having a lobulated, spongy aspect. It is described by the author as 'fibroma papillare cartilaginescens.'

7. Pfannenstiel's patient was a multipara, aged fifty-three, who, five years after the climacteric, became subject to vaginal discharge and pain in the sacral region. A polypoid tumour—which was taken to be an ordinary mucous polypus—was removed from the anterior lip of the os uteri. Eleven months later it was found to have recurred, as a large grape-like outgrowth, which filled the vagina. The mass was then cut away, the stump being curetted. Six months later a recurrent growth, nearly as large as before, was again found. Although the patient was weak and cachectic, the whole uterus was successfully extirpated. Recurrence was detected, five months later, in the vaginal vault. This was excised and the wound was cauterised, but the disease soon returned again. When last seen, sixteen months after hysterectomy, she was in a weak and emaciated condition; and the vagina was extensively infiltrated. The author signalises the disease as 'Das traubige Sarcom.' The sarcomatous matrix consisted of round and spindle celled structure, in which nodules of hyaline cartilage were embedded; and the matrix presented softened lymph-œdematous areas.

Ozenne, Gaymann and others have met with similar cases.

Sarcoma of the Mucosa.

This is probably the commonest form of uterine sarcoma. Even as early as 1868, Virchow had discriminated the condition, and collected notes of several cases.

The disease originates from the connective-tissue elements of the mucosa; and, since glandular elements are rarely found in such growths, we may conclude that the initial morbid focus, is seldom situated in the immediate vicinity of these structures. Some observations by Keller and Kahlden, corroborate this view; for they found sarcomatous growths, that had originated from the deep part of the mucosa, completely covered by the more superficial part of this membrane with its glands. In certain cases, it seems probable that mucosal sarcomata arise from the walls of the blood-vessels and lymphatics, or of their adventitia. The disease usually assumes the form of a diffuse infiltration of the

mucosa, with the production of numerous softish, rounded nodules or polypoid bosses (Fig. 56). In a remarkable case reported by A. R. Simpson, the infiltration spread from the uterus along the mucosa of the Fallopian tubes, until it projected from their fimbriated extremities. In the corpus uteri, growths of this kind not unfrequently attain large size, and

FIG. 56.—DIFFUSE SARCOMA OF THE UTERINE MUCOSA, WITH A BLOOD CYST IN THE UTERINE WALL, AND HÆMATOMETRA. (PÉAN.)

the intra-uterine fungoid masses are apt to cause atrophy and weakening of the uterine wall, with a patulous condition of the os, that favours inversion; which is much oftener met with in this disease (4 in 48 cases) than in cancer.

Hæmatometra is also relatively often met with under these circumstances; and instances of pyometra have been reported.

Exceptionally, mucosal sarcomata involve only a circumscribed area, when they tend to become polypoid.

Histologically these neoplasms usually consist mainly of round and spindle cells, held together by scanty fibrillar matrix—rich in bloodvessels—which is often œdematous.

The vascular development is sometimes very considerable, as in cases studied by Guttenplan, Johannovsky, Kahlden, Pestalozza, etc.

Brandt has reported an instance of lymphosarcoma of the uterine mucosa. Myxomatous types of the disease are very common in this locality; and forms, in which fibrous tissue abounds, are by no means rare.

Giant cells are numerous in some specimens (Kahlden, Rheinstein, Terrillon); and a psammomatous variety of the disease has been described (Noeggerath).

Glandular structures were intermixed with the sarcomatous new formation, in cases studied by Kay, Braman and Schmitt; and in Whitridge Williams' remarkable case, many of the tumour cells contained blackish pigment.

In E. Wagner's specimen, chondromatous elements were present in the sarcomatous new formation.

Mundé and others have found sarcoma of the endometrium, coexisting with myoma of the adjacent musculature.

Mucosal sarcomata are prone to recur; and they not unfrequently disseminate in the vagina and parametrium, as well as at a distance—especially in the lungs, etc.

This form of disease clinically resembles 'chronic hyperplastic endometritis.' A patulous condition of the os is often very noticeable; which renders digital intra-uterine examination easy.

Of 12 cases collected by me, the age-distribution was as follows:—under 20, 1; 20 to 30, 1; 30 to 40, 5; 40 to 50, 1; 50 to 60, 2; 60 to 70, 1; and over 70, 1.

Subjoined are reports of some typical examples of the disease, as it affects the corpus:—

1. In a case under my own observation, the patient was a nulliparous single woman, aged twenty-six, whose previous health had been good. The catamenia appeared at fourteen;

and she had since been regular—although subject to dysmenorrhœa—until this illness began. The symptoms were of two years' duration, beginning with leucorrhœal discharge; and subsequently 'flooding' supervened, with continuous sanious discharge. Enlargement of the lower part of the abdomen was first noticed, soon after the onset of the flooding. During the last few months, there had been much pain; and œdema of the right leg and ankle had set in a few weeks previously. There was no family history of malignant disease. On examination, she was found to have a large intra-abdominal tumour, which extended from the pelvis to the umbilicus. The tumour extended laterally to each iliac region; and it appeared to be fixed to its pelvic attachment. It felt smooth, rather firm and circumscribed, and was dull on percussion. Nothing was heard on auscultation. Vaginal examination, revealed a soft sloughing mass just within the dilated os uteri; the uterus was greatly enlarged and was continuous with the intra-abdominal tumour; there was profuse, fœtid, vaginal discharge; and the examination caused free hæmorrhage. Some time later laparotomy was performed, the incision extending from the umbilicus to the pubes. The tumour proved to be the enormously distended uterus. The only adhesions were to the bladder and the vermiform appendix. These having been separated, the uterus was raised up out of the pelvis; the broad ligaments were divided; and Tait's clamp was applied as low down as possible. The uterus and its appendages were then cut away. On examination, it was found that the stump of the cervix was extensively infiltrated by the disease. It was, therefore, freely seared with the actual cautery. The pedicle, with the clamp on, was fixed in the lower part of the wound, which was closed with superficial and deep sutures.

The parts removed, comprised the whole of the body of the uterus and part of the cervix, both tubes and ovaries. The inner surface of the uterus, was found to be infiltrated with a soft, whitish, new growth, in places gelatiniform, whence polypoidal outgrowths projected into the uterine cavity; but nowhere had the disease penetrated the uterine wall. On microscopical examination, the diseased structure was found to be small spindle-celled, fibro-sarcoma.

Shortly after the operation, free hæmorrhage from the pedicle supervened, which was with difficulty arrested after the use of the

actual cautery, by the application of powdered persulphate of iron. The patient made a slow, but complete recovery, from the operation; but fresh growth from the pedicle soon set in. This was destroyed several times with Fell's paste, but it constantly recurred. Five months after the operation, she had extensive recurrence in this situation. When last seen, a year later, a large, raw, fungoid outgrowth of recurrent disease occupied the hypogastric region. Half a year later, she was reported to be still alive, with the disease progressing.

2. Péan has met with a somewhat similar case, in which diffuse sarcoma of the mucosa of the corpus, was complicated by hæmatometra, and a large blood-cyst of the musculature.

The patient was a multipara, aged fifty-three, with symptoms of uterine ailment of twenty years' duration; but nothing serious was complained of until three years previously, when—shortly after the menopause—a rapidly increasing intra-abdominal tumour was noticed. When first seen by Péan, the whole abdomen was distended by a large tumour, which was taken to be an ovarian cyst. The portio was obliterated, and the os very much drawn upwards. The patient was weak and exhausted; and hardly able to breathe, on account of the pressure of the tumour on the diaphragm. To prevent suffocation, the tumour was tapped, and 15 litres of blood-stained fluid, mixed with clots, were withdrawn. Two months later laparotomy was performed. The tumour proved to be the uterus, enormously distended by soft sarcomatous growth within it—which had taken the form of polypoid bosses—and by blood-stained fluid; in the musculature was a large, smooth-walled cyst, containing several litres of blood (Fig. 56). The tumour and adjacent parts were exceedingly vascular. It was removed by supravaginal hysterectomy, the pedicle being clamped with a wire serre-nœud.

The patient recovered from the operation; but of her after-history nothing is related. Histological examination, showed that the disease was round and spindle-celled sarcoma, involving the whole mucosa of the corpus, but not that of the cervix.

3. Lancéreaux, in his 'Atlas of Pathological Anatomy,' has described and figured another case of the same sort, in which the uterus was enormously distended by huge polypoid masses of myxo-sarcomatous growth. In this case also, the cervix was unaffected.

4. In Coleman's case, a seven-para, aged sixty-seven—in whom the menopause was not established until fifty-five—had been subject to sanious vaginal discharge for one and a half years. For this she had been twice curetted, without any benefit. As signs of an intra-uterine growth were detected, vaginal hysterectomy was performed. She soon recovered from the operation; but died comatose, three months afterwards, having first developed left hemiplegia. There was no necropsy; but, before death, the vaginal roof was found to be full of soft recurrent growth; and there was a large tumour in the right iliac region, and just below the umbilicus another tumour could be felt.

On examination of the uterus after removal, its cavity was found full of soft, succulent, pale pinkish, polypoid masses, which projected from the infiltrated mucosa. The uterus was greatly enlarged, the os patulous, the cervix, portio and vagina being normal. The tumour was composed almost exclusively of large, round and spindle cells, with here and there giant cells; and hardly any intervening fibrous stroma. The morbid tissue was pervaded by numerous large bloodvessels. The whole mucosa of the corpus was affected, but the musculature appeared to have escaped invasion. The tubes were unaffected, except in the vicinity of the uterine cornua, where the disease had invaded the mucosa to a small extent.

5. Vignard's patient, was an unmarried nullipara, aged sixty, who had manifested symptoms of uterine disease for five years. On examination, she was found to have a large intra-abdominal tumour, with signs of an intra-uterine growth. Laparotomy was performed, and the enlarged uterus, which weighed over 9 pounds, was completely extirpated. It was found to be affected with diffuse sarcoma of the mucosa, the condition met with being similar to that just described in Coleman's case. The os externum was stenosed, and there was hæmatometra. When last heard of, three years after the operation, this patient was well, and free from any return of the disease.

6. In Walter Swayne's case, diffuse sarcoma of the endometrium was complicated with inversion. His patient was a nullipara, aged seventeen, with a placenta-like substance, presenting at the intact vaginal orifice. This proved to be the inverted fundus, covered with a thick mass of mucosal sarcomatous growth. She also had vesico-vaginal fistula. The disease was extirpated with scissors

and curette; but recurrence soon ensued, of which she died seven months later.

7. Williamson has also reported an instance of mucosal sarcoma complicated with inversion, in a woman of eighty; and, in this case, there was a secondary deposit in the left vaginal fornix. The disease was extirpated by scraping, more than once; but it soon recurred, and the inverted uterus could not be replaced. She died thus of cerebral hæmorrhage, three months after the last operation.

Sarcoma of the Parenchyma.

In this situation, the disease usually assumes a decidedly circumscribed form; but instances of diffuse sarcomatosis of the uterine wall, have occasionally been observed. The circumscribed variety, in its general features, much resembles myoma; except that a distinct capsule is seldom noticeable. Growths of this kind, often assume a polypoid form. They are prone to inflame, slough and gangrene, especially when subperitoneal. The disease is commoner in the corpus than in the cervix; and, like other forms of sarcoma, it is apt to recur, disseminate, and manifest all the well-known characteristics of malignancy.

In the structure of these sarcomata, round (Fig. 57) and spindle celled forms predominate; but myeloid elements have often been noticed. Fibrous tissue, organic muscle cells, bloodvessels and lymphatics, are also among their usual constituents. Myxomatous and œdematous modifications are fairly common.

From the fact that epithelial structures, and even bits of cartilage, have been found in neoplasms of this kind; it may be inferred, that the disease often arises from aberrant elements, connected with these heterotopic anomalies (*vitium primæ formationis*).

It accords with this, that uterine sarcomata have been found associated with various developmental defects:—Thus, Howe has seen sarcoma of one horn of a double uterus, together with hydrometra; and with 'septum vaginæ retro-hymenale,' Breisky found sarcomatous disease of the uterus. Braxton Hicks has described a case of congenital absence of the

uterus, tubes and ovaries, in which a large cystic myxo-sarcoma, occupied the place of the absent uterus. The patient was an ill-developed woman, aged twenty-four, who had never menstruated.

Many pathologists maintain, that sarcomata of the parenchyma always arise from myomata; and this view has been sanctioned by such high authorities as Virchow, Rokitansky, and Schroeder. I have elsewhere referred to cases of this kind (Chapter IX., p. 116); and the reality of this mode of origin may, I think, be taken for granted.

FIG. 57.—HISTOLOGICAL SECTION, SHOWING THE STRUCTURE OF A SARCOMA OF THE UTERINE WALL. (WYDER.)

Recent observations have, however, shown; that such tumours may also arise from the constituent elements of the part, especially from those connected with its bloodvessels and lymphatics, as in cases studied by Cornil (for Péan), Kahlden and others.

Among sarcomata of the parenchyma, the so-called 'recurrent fibroid' tumours of the uterus, must also be included, of which examples were long ago described by Callender and Hutchinson; and more recently by Finlay (*q.v.*, Chapter IX., p. 118). In Callender's case, the disease disseminated in

the adjacent lymph glands, the pericardium, lungs and in the sixth cervical vertebra; and in Hutchinson's, there were repeated local recurrences.

Telangiectasic, lymphangiectasic and cystic changes, are not uncommon. The following case by Aslanian is an example of the telangiectasic variety:

A woman, aged forty, with an intra-abdominal tumour, much larger than the pregnant uterus at term. It gave the impression of a large ovarian cyst, and seemed to fluctuate. No metrorrhagia had occurred. Abdominal section revealed an enormous soft tumour, attached by a broad pedicle to the left side of the uterus. There were several small fibromyomata in other parts of the organ. The tumour weighed 24 pounds after removal. It was of a spongy, soft texture, full of large plexuses and lacunæ. The stroma was sarcomatous. After section, several pints of blood oozed from its cut surface, although there were no distinct cystic cavities in it.

Menge, Fehling and Leopold, have described instances of the lymphangiectasic form of the disease.

Of 14 cases of sarcoma of the parenchyma, noted by Péan, the age-distribution was as follows:—1 at 30, 3 at 30 to 40, 7 at 40 to 50, 3 at 50 to 60.

The Cystic Variety.

The cystic variety of this form of sarcoma is rare; for, in his large experience, Péan has met with only five cases. Pseudo-cysts ('géodes') due to softening and deliquescence of the tumour substance, are commoner than true cysts. Of the latter, multilocular and unilocular varieties are met with. These originate — like the corresponding forms of cystic myomata — either from epithelial inclusions, which are generally of embryonic origin; or from the bloodvessels or lymphatics of the part. Most cystic sarcomata are of the subperitoneal variety; and they are generally connected with the uterine fundus by a neck or stalk, hence they may easily be mistaken for ovarian cystoma. Such tumours

are very prone to sudden enlargement, owing to inflammation and local gangrene; hence also they often contract adhesions with adjacent structures, and their presence is apt to cause the accumulation of fluid in the peritoneal cavity. These tumours are often exceedingly vascular. Cystic sarcomata sometimes attain enormous size, specimens weighing over 80 pounds having been met with. Péan has found two separate tumours of this kind in one uterus—the one on its left and the other on its right side. Nicaise has reported an instance in which a cystic sarcoma of the fundus, having been tapped through the abdominal wall, under the belief that it was a cyst, sarcomatous disease soon afterwards developed in the puncture track.

The following cases, will suffice to illustrate the chief features of the cystic form of the disease:

1. In Fenger's case, the patient—aged thirty-five—presented a large, fluctuating, intra-abdominal tumour, which was taken for an ovarian cyst. On opening the abdomen, the tumour proved to be a smooth, subperitoneal, cystic sarcoma of the fundus uteri; and near to it were two small myomata. On section, after removal, its general aspect was that of a myoma; but its cut surface presented areas of softish sarcomatous structure, and numerous pseudo-cystic cavities. Gangrenous suppuration at the seat of its implantation, caused the death of the patient, in the third week after the operation.

2. In a married woman, with symptoms of uterine tumour o five years' duration, Péan found a large multilocular, cystic sarcoma. She was anæmic and cachectic; and had suffered from menorrhagia for one year. On opening the abdomen, a large, lobulated, vascular cystic mass was exposed, which was connected with the uterine fundus. There were numerous adhesions. Having separated these and evacuated the largest cysts, an elastic ligature was fixed round the cervix; and the sarcomatous corpus uteri was amputated above it. The stump was treated by the intraperitoneal method and left, as there was extensive dissemination of the disease in the pelvic and abdominal lymph glands. She recovered from the operation, but succumbed to acute peritonitis some time afterwards. At the necropsy, this

was found to be due to a sloughing sarcomatous gland, which had opened into the peritoneum, besides perforating a large bloodvessel and causing internal hæmorrhage. The solid part of the tumour weighed 2 kilos; the fluid part 8 kilos.

3. In a case reported by Cullingworth, a large tumour of this kind (6½ by 8 inches), was embedded in the atrophied uterine wall, in the left side and in front. It was removed, together with the whole uterus and its appendages, by abdominal section. After removal, the tumour was easily turned out of its bed. On section, it presented a mass of small cysts, in a coarse vascular membraniform meshwork. Histologically, it was a spindle-celled sarcoma. The patient was a nulliparous widow, aged thirty-seven.

Sarcoma of the Cervix.

On account of the clinical importance of the disease in this situation, separate consideration of the subject seems desirable; although the general features of cervical sarcoma have already been indicated. Infantile, racemose, mucosal and parenchymatous forms may be recognised.

The great relative frequency with which heterotopic cartilaginous elements are found in these tumours, is a remarkable feature; which—taken in conjunction with other facts of like import—indicates that this form of the disease is often of embryonic origin.

Cervical sarcomata, are of more frequent occurrence than is generally believed; for I have found that the majority of the recorded cases of uterine sarcoma, belong to this locality.

The infantile and racemose varieties of the disease, having already been sufficiently described, it is only the mucosal and parenchymatous forms that now need further notice.

Examples of the **mucosal** form of cervical sarcoma have been reported by Leopold, Kleinschmidt, Galabin, Hunter, Kaltenbach, Dressler, Rosthorn, Geissler, Veit and others.

In a case by Kleinschmidt, a soft, lobulated, friable tumour of this kind, the size of an orange, grew from the cervix. It was excised, and the patient remained well for a year. During this time she became pregnant; and was delivered naturally of a living

child at term. Shortly afterwards, she was found to have recurrence; and there was a deposit in the left parametrium. The tumour was again cut away, but there was further recurrence two months later. The primary tumour, proved to be a spindle-celled angio-sarcoma; and it contained several nodules of cartilage.

Similar heterotopic elements, were found in a round and spindle-celled sarcoma of the cervical mucosa, in a patient aged fifty, as described by Geissler.

In Hunter's case, the patient's age was thirty-seven, and she had borne one child. On examination, a soft, lobulated, bleeding mass was found, springing from the cervix uteri; the requisite manipulation caused much hæmorrhage. The growth was removed by supravaginal amputation. Histologically, it was a spindle-celled sarcoma.

Rosthorn's patient was forty-three years old. The tumour contained round, spindle and myeloid cells. It recurred five times after operation; and eventually disseminated in the right ribs.

In a Middlesex Hospital patient, aged thirty-four, who died with a soft, ulcerating, angio-sarcomatous growth of the cervix, numerous secondary deposits were found in the skin and subcutaneous tissue of the chest—including both breasts—neck and abdomen. Both ovaries and Fallopian tubes were similarly invaded; as also were the mesenteric, retroperitoneal, and mediastinal glands, both kidneys, both pleuræ, the peritoneum and the peripancreatic tissues. The common bile-duct, was obstructed by a growth in the portal fissure of the liver. The pericardium, both pleuræ and the heart were also invaded; but the lungs, liver and spleen had escaped. No operation had been done for the uterine disease.

In cases by Johnston and Hackelung, glandular structures were intermixed with the sarcomatous disease.

Melano-sarcoma is one of the rarest uterine tumours; but instances have been reported in the cervix by Johnston, Seeger, Taylor, Kobner, and Whitridge Williams.

In Johnston's case, the patient was a negress, aged forty, having a polypoid tumour projecting from the cervix. It was

covered externally, with the somewhat thickened, epidermis-like membrane of the portio. On section, the tumour presented an alveolated appearance, with small cysts here and there. The alveolar stroma, consisted mainly of large spindle cells and delicate connective-tissue fibres, in which numerous more or less imperfectly developed bloodvessels were embedded. The alveoli contained rounded cells, rich in pigment. A lining of columnar epithelium, could be made out in many of the cysts. The tumour is described by the author as 'melanotic alveolar sarcoma.'

Whitridge Williams' patient was sixty years old; and the fundus as well as the cervix was affected, both tumours consisting of spindle and myeloid cells, many of which were pigmented. The cervix was transformed into a softish, irregular, blackish mass, which projected into the vagina; and a tumour of similar aspect, the size of a man's head, occupied the fundus. The pelvic glands were similarly affected; and there were secondary deposits in the brain. The patient died of marasmus; and œdema of the lungs.

As instances of the **parenchymatous** form of cervical sarcoma, the following will suffice:

In Galabin's case, the disease clinically resembled cancer, the uterus being fixed. It was removed by vaginal hysterectomy; and the patient was free from recurrence, when last seen, six months after the operation. The tumour sprang from the parenchyma of the cervix, the mucosa of which was unaffected. Histologically, it was a round-celled fibrifying sarcoma.

Dakin's patient was a widow, aged fifty-one, who had suffered from metrorrhagia for six months; menstruation having ceased at forty-five. No sign of the disease was visible, on vaginal examination; but the tumour could be felt just within the os, and it proved to be spindle-celled sarcoma.

In a case by Rosthorn a spindle-celled sarcoma—the size of a goose's egg—was embedded in the posterior cervical wall. It was extirpated, and the patient—a maid of seventeen—recovered.

In Grenser's case, a tumour of this kind recurred two and a half years after its removal by the galvano-cautery.

Generalities.

The following analysis by Gusserow, shows the influence of **age** in the evolution of uterine sarcomata in general:

Of 73 cases—	4	began under the age of	19
	5	began from	20 to 30
	15	,, ,,	30 to 40
	28	,, ,,	40 to 50
	18	,, ,,	50 to 60
	3	,, above	60

An unusually large proportion of these sarcoma patients, are relatively or absolutely **sterile**. Of 74 cases tabulated by Gusserow, 25 were absolutely sterile (4 being virgins); and 35 parous women had between them only 51 children, or 1·46 each.

The **symptoms** of uterine sarcoma, are similar to those of cancer, viz., hæmorrhage, discharge and pain. The sarcomatous tumour, is generally much more bulky, than the cancerous one; hence, an appreciable abdominal enlargement, œdema of the lower limbs, and distension of the veins of the abdominal wall, are more frequently noticeable than with cancer. On physical examination, the uterus is found to be much increased in size; and to be connected with the tumour.

The racemose cervical sarcomata, can readily be distinguished from cancerous excrescences, by noting the peculiar, soft, shiny, grapelike masses of the neoplasm, which are easily detachable. In most other cases, the differential diagnosis can only be made, by the microscopical examination of fragments of the disease removed with the curette.

The indications for **treatment**, are precisely the same as for cancer; but, so far as can be judged from the imperfect data at present available, the results as to freedom from recurrence, etc., are less satisfactory, than after similar operations for cancer.

The excessive vascularity of these tumours, makes hæmostasis unusually difficult; while their great size, increases the liability to shock. Of Péan's 24 operated cases, 12 died—

5 of shock; of 14 abdominal extirpations, 6 recovered and were able to return to their homes, free from recurrence; and of 7 vaginal extirpations, 3 likewise recovered.

Deciduo-sarcoma.

Pathologists and clinicians have manifested great interest in this disease, ever since Sänger demonstrated the first example of it, at the Leipzig Gynæcological Society in 1888.

The pathological discussion, has centred chiefly on the question of genesis—whether from the products of conception or from uterine constituents. The tissue type of its histogenetic elements, has also been much discussed; especially as to whether these are of epithelial (cancerous), or of connective-tissue (sarcomatous) nature. For clinicians, interest has centred in the demonstration of the connection of the disease with pregnancy, especially with abortions and 'mole' pregnancies; and in the recognition of its highly malignant qualities.

It has long been recognised, that various polypoid formations are apt to arise post-partum, at the placental site. Many of these are due to the retention of portions of fully formed placenta; and others, to supernumerary placentæ—in the form of separate cotyledons—persisting after birth.

One of the first to demonstrate the presence of islets of placental structures, persisting in the uterine mucosa long after delivery, was Küstner. In these, decidual elements preponderated—readily distinguishable by their characteristic large cells (Fig. 15, p. 44)—each islet being surrounded by a zone of small round cells. In many instances, chorionic villosities and trophoblastic buds, have since been detected in relics of this kind. This condition is commonest after premature deliveries, hence it has been called by Fritsch, 'post-abortum' or decidual endometritis.

To the somewhat larger, and more highly organised, residual structures of this kind; that, by proliferation of their elements, assume polypoid or tumour-like form, the terms 'decidual,' 'chorionic,' or 'placental' polypus, have been

applied. Such growths are usually of innocent nature; hence they have also been designated 'deciduoma benignum.' Lejars and others have lately called special attention to formations of this kind.

It is believed that deciduo-sarcomata, often arise from these residua; and especially from 'rests,' persisting after 'mole' pregnancies.

FIG. 58.—THE HISTOLOGICAL STRUCTURE OF 'DECIDUOMA MALIGNUM.' (MARCHAND.)

s, Syncytium; *ns*, necrotic mass; *l*, leucocytes; *bg*, connective tissue; *c*, cellular part of the tumour (decidual ?); *n*, nuclei in the syncytium; *ns*, degenerating nuclei in the syncytium.

More than ten years before the publication of Sänger's case, Chiari had called the attention of the profession to instances of post-partum malignant disease, in all of which the neoplasm developed at the placental site; and these, no doubt, really were examples of 'deciduoma malignum.'

In Sänger's case, the patient was a healthy woman, aged twenty-four, who had only been married for four months; when an incomplete abortion supervened in the eighth week, with subsequent

hæmorrhages and fœtid discharge. When Sänger first saw her, she seemed to be suffering from septic symptoms, owing to the retention of putrid products of conception. The uterus was dilated and cleared out; but, in spite of this, the patient did not regain her usual health. A large tumour gradually formed in the right iliac region. She became weak and emaciated, cough and dyspnœa supervened; and she died thus, seven months after the abortion. At the necropsy, the uterus was as large as at the fourth month of pregnancy; and several large tumours, of a dark red colour, projected from its surface. There were secondary growths, of the same characters as the primary tumour, in the lungs, diaphragm, iliac fossæ, and in the tenth right rib. Histologically, the uterine tumour, as well as the secondary growths, consisted of areas of large cells, just like decidual cells (Fig. 58), these areas being separated from one another by hæmorrhagic tracts. Numerous open spaces and many giant cells, were also seen. In some of the specimens, the characteristic cells of the neoplasm, were grouped around the bloodvessels. Sänger concluded, that its constituent cells were of decidual origin; and that he had to do, with a hitherto undescribed kind of neoplasm, which he proposed to name 'deciduoma malignum.'

Pfeiffer, Müller and others, soon reported similar cases.

In 1893, Sänger published a more elaborate account of his observations, together with a critical review of all the recorded cases; and, in this work, he abandoned the term 'deciduoma malignum,' substituting for it that of 'sarcoma deciduo-cellulare,' as indicating more clearly his view as to the origin of the disease.

In a case reported by Gottschalk, the patient, aged forty-two—after an abortion at the second month—became subject to irregular flooding and discharge, for which the curette and tampon were repeatedly used without benefit. Five months after the abortion, the cervix was therefore dilated; and a villous mass—that proved to be sarcomatous—was removed. A month later, as a last resort, the uterus and its appendages were removed *per vaginam*. The patient recovered from the operation, and for a time her general condition improved; but, some months later, signs of internal dissemination appeared; and she died thus, seven months after

the operation, with metastases in the lungs, kidneys, etc. Microscopical examination, showed that the primary tumour consisted of large, sarcoma-like cells, which Gottschalk believed originated in the chorionic villi; the secondary growths were of a similar structure. According to Gottschalk, therefore, the disease is a sarcoma of fœtal, rather than of maternal, origin (chorio-sarcoma).

Marchand's publication, constitutes the next important landmark. His investigations are based upon the personal study of his own specimens; and upon a review of all the cases previously reported. He concludes, that the disease arises from the malignant development of epithelial elements of the chorionic villi, parasitic in the uterine mucosa; and, therefore, that it is neither deciduoma nor sarcoma. He regards it as true cancer (chorio-carcinoma); but, since in its biological properties—especially in that it almost invariably disseminates by the bloodvessels—the disease so closely resembles sarcoma, Marchand proposes to designate such growths provisionally as 'serotinal tumours.'

Neumann and others, maintain that both maternal and fœtal elements, enter into the formation of these neoplasms.

According to Reinecke, however, the large-celled elements found in them, are neither decidual nor chorionic products; but derivatives of the myometrium.

Eden comes to a similar conclusion, for he believes that plasmodiæ—like those figured in Marchand's case, as syncytial masses—may often be found in sarcomata in other parts of the body.

The disease, I believe, never arises from the cervix; the fundus or its vicinity is its usual seat of origin.

In reviewing the whole subject, the following seem to me to be the crucial points:—

1. The frequent occurrence of the disease, post-partum; especially after miscarriages, and 'mole' pregnancy. I am not aware, of a single conclusive instance of this disease, having occurred independently of pregnancy. Of 53 cases tabulated by Lönnberg and Mannheimer, in no less than 24, there was clear history of previous 'mole' pregnancy. It is evident, therefore, that pregnancy—and especially 'mole'

pregnancy—predisposes those thus affected, to the subsequent development of this form of malignant disease.

2. The histological resemblance, of the bulk of the tumour substance, to decidual tissue; which I consider has been clearly established.

Whence I conclude, that 'deciduoma malignum' is a special variety of sarcomatous disease, arising from decidual elements; which tends to progress with unusual rapidity, owing to its coincidence with pregnancy.

The first **symptoms** of the disease, generally appear soon after parturition—usually after abortion, or the passage of a 'hydatidiform mole.'

The average age of those affected, is about thirty-three years—9 out of 16 cases in my list, being under thirty at the date of its onset.

Irregular metrorrhagia—often profuse—soon after parturition, together with fœtid discharge, are usually the earliest symptoms. The hæmorrhage may be unusually difficult to arrest; and several patients have died from this cause. These symptoms, are at first generally ascribed to retention of the products of conception. In Gottschalk's case, the disease was diagnosed by the microscopical examination of tumour substance, scraped from the uterine cavity, after dilatation of the cervix. The progress of the disease is marked by rapid emaciation, loss of strength, and cachexia. Anorexia, nausea and vomiting are generally prominent symptoms.

Variable pain, and a certain amount of pyrexia, may be experienced. On vaginal examination, the uterus is often found to be unduly bulky; and, by bimanual palpation, irregular bosses can sometimes be felt on its surface. Sanious discharge may be seen issuing from the patulous os, the cervix and portio being in other respects normal. This will suggest the propriety of intra-uterine examination; when the disease may be detected in the products removed; or its presence may be suspected if, with the examining finger, a softened area can be felt in the uterine wall. These tumours generally present as soft, shaggy outgrowths. The disease has a special tendency to invade the bloodvessels,

which are very numerous; hence, metastases form early, and are widely diffused; the lungs and pleuræ are their commonest seats, but they occur also in the liver, kidneys, intestines, stomach, ovaries, spleen, brain and in the bones (ribs, femur, etc.). Deposits often appear in the vagina, and sometimes in the vulva.

Before undertaking operations for this disease, the lungs should be carefully examined for pulmonary metastases; which, as Eirmann has shown, occur with special frequency. Indeed, the pulmonary symptoms—which comprise hæmoptysis and fever—may be so prominent, as to mask the original uterine condition; hence, in several cases, this form of malignant lung disease, has been mistaken for acute pulmonary tubercle, etc.

The only operative treatment of any avail, is total extirpation of the disease, together with the uterus, ovaries, tubes etc., by the abdominal route, as in the radical operation for cancer.

Of 14 such cases, tabulated by me, 2 died directly from the effects of the operation; of the other 12, 5 died with recurrence within the first year; and, of the remaining 7, 6 were free from recurrence when last heard of—ten months, nine months, seven months (2 cases), five and a half months and three months after the operation, respectively—while nothing is said, as to the after-condition of the other patient.

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ERRATUM.

P. 53, line 11 from top, *for* 'shown' *read* 'strewn.'

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